

FIG. 1

FIG. 2 is a block diagram of a system for processing NGTN event data. The system includes a central processing unit (200) connected to a network of sensors (210) and a database (225). The central processing unit (200) is connected to a network of sensors (210) and a database (225). The central processing unit (200) is connected to a network of sensors (210) and a database (225).

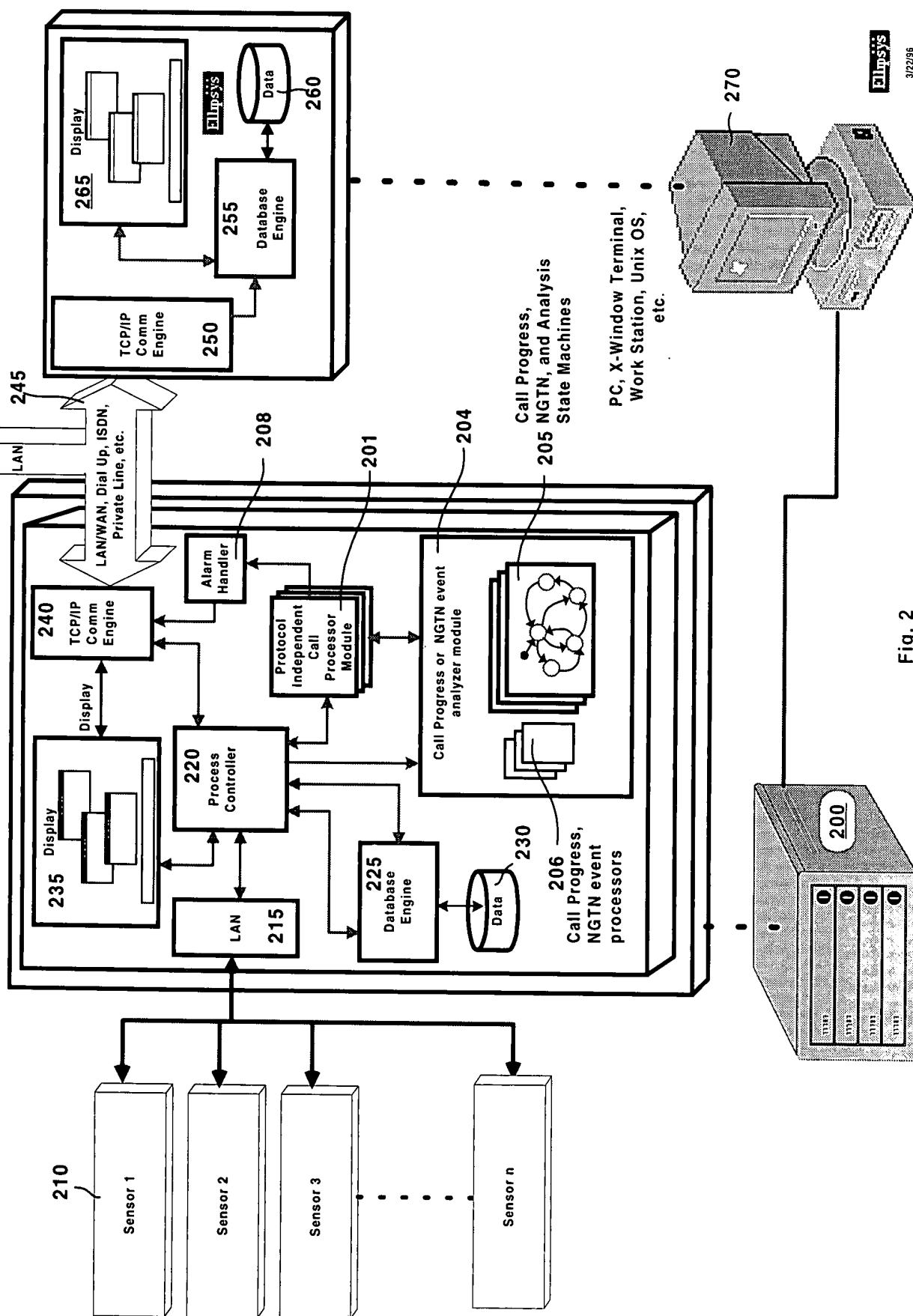


Fig. 2

<u>Msg. Type</u>	<u>Time (ms)</u>	<u>Side 1 ABCD</u>	<u>Side 2 ABCD</u>	<u>Side 1 CPT</u>	<u>Side 2 CPT</u>	<u>Ckt ID</u>
Supervision	0000.000	0101	0101			1<CR>
Msg. 1 <CR>						
Supervision	0320.000	0000	0101			1<CR>
Msg. 2 <CR>						
Supervision	0322.000	0101	0101			1<CR>
Msg. 3 <CR>						
Supervision	0326.000	0000	0101			1<CR>
Msg. 4 <CR>						
Supervision	0328.000	0101	0101			1<CR>
Msg. 5 <CR>						
Supervision	0329.455	0101	1111			1<CR>
Msg. 6 <CR>						
Supervision	1565.100	0101	0101			1<CR>
Msg. 7 <CR>						

FIG 3A

<u>Msg. Type</u>	<u>Time Stamp</u>	<u>Raw Signal</u>	<u>Physical Event</u>
Supervision Msg. 1 <CR>	0000.000	0101,0101	On Hook
Supervision Msg. 2 <CR>	0320.000	0000,0101	Machine Ring On
Supervision Msg. 3 <CR>	0322.000	0101,0101	Machine Ring Off
Supervision Msg. 4 <CR>	0326.000	0000,0101	Machine Ring On
Supervision Msg. 5 <CR>	0328.000	0101,0101	Machine Ring Off
Supervision Msg. 6 <CR>	0329.455	0101,1111	Off Hook
Supervision Msg. 7 <CR>	1565.100	0101,0101	On Hook

FIG 3B

<u>Msg. Type</u>	<u>Time Stamp</u>	<u>Raw Signal</u>	<u>Physical Event</u>	<u>State</u>
Supervision Msg. 1 <CR>	0000.000	0101.0101	On Hook	Idle
Supervision Msg. 2 <CR>	0320.000	0000.0101	Machine Ring On	Ring On
Supervision Msg. 3 <CR>	0322.000	0101.0101	Machine Ring Off	Ring Off
Supervision Msg. 4 <CR>	0326.000	0000.0101	Machine Ring On	Ring On
Supervision Msg. 5 <CR>	0328.000	0101.0101	Machine Ring Off	Ring Off
Supervision Msg. 6 <CR>	0329.455	0101.1111	Off Hook	Answer
Off Hook Timer	0331.455			Stable Call
Supervision Msg. 7 <CR>	1565.100	0101.0101	On Hook	Station On Hook

FIG 3C

<u>Msg. Type</u>	<u>Time (ms)</u>		<u>Ckt ID</u>
CA_NotificationRequest	0000.000	RQNT 1201 endpoint-1@rgw-2567.whatever.net SGCP 1.1 N: ca@ca1.whatever.net:5678 R: hd	1<CR>
GW_Ack	0000.123	200 1201 OK	1<CR>
CA_NotificationRequest	0319.856	RQNT 1202 endpoint-1@rgw-2567.whatever.net SGCP 1.1 N: ca@ca1.whatever.net:5678 R: hd S: rg	1<CR>
GW_Ack	0319.947	200 1202 OK	1<CR>
GW_Notify	0329.571	NTFY 2001 endpoint-1@rgw-2567.whatever.net SGCP 1.1 N: ca@ca1.whatever.net:5678 O: hd	1<CR>
CA_Ack	0330.023	200 2001 OK	1<CR>
CA_NotificationRequest	0332.838	RQNT 1203 endpoint-1@rgw-2567.whatever.net SGCP 1.1 N: ca@ca1.whatever.net:5678 R: hu	1<CR>
GW_Ack	0332.927	200 1203 OK	1<CR>
GW_Notify	1565.367	NTFY 2002 endpoint-1@rgw-2567.whatever.net SGCP 1.1 N: ca@ca1.whatever.net:5678 O: hu	1<CR>
CA_Ack	1565.501	200 2002 OK	1<CR>
CA_NotificationRequest	1572.492	RQNT 1204 endpoint-1@rgw-2567.whatever.net SGCP 1.1 N: ca@ca1.whatever.net:5678 R: hd	1<CR>
GW_Ack	1572.612	200 1204 OK	1<CR>

FIG 3D

<u>Msg. Type</u>	<u>Time Stamp</u>	<u>Raw Message</u>	<u>Ckt ID</u>
CA_NotificationRequest	0000.000	CA_RQNT,1201, R: hd	1<CR>
GW_Ack	0000.123	GW_ACK,1201,200	1<CR>
CA_NotificationRequest	0319.856	CA_RQNT,1202, S: rg	1<CR>
GW_Ack	0319.947	GW_ACK,1202,200	1<CR>
GW_Notify	0329.571	GW_NTFY,2001, O: hd	1<CR>
CA_Ack	0330.023	CA_ACK,2001,200	1<CR>
CA_NotificationRequest	0332.838	CA_RQNT,1203, R: hu	1<CR>
GW_Ack	0332.927	GW_ACK,1203,200	1<CR>
GW_Notify	1565.367	GW_NTFY,2002, O: hu	1<CR>
CA_Ack	1565.501	CA_ACK,2002,200	1<CR>
CA_NotificationRequest	1572.492	CA_RQNT,1204, R: hd	1<CR>
GW_Ack	1572.612	GW_ACK,1204,200	1<CR>

FIG 3E

<u>Msg. Type</u>	<u>Time Stamp</u>	<u>Raw Message</u>	<u>Call Control Event</u>	<u>State</u>
CA_NotificationRequest	0000.000	CA_RQNT,1201, R: hd	Wait for Off Hook	IdleWaiting
GW_Ack	0000.123	GW_ACK,1201,200	Command Accepted	IdleReady
CA_NotificationRequest	0319.856	CA_RQNT,1202, S: rg	Ring Phone	AlertingStart
GW_Ack	0319.947	GW_ACK,1202,200	Command Accepted	Alerting
GW_Notify	0329.571	GW_NTFY,2001, O: hd	Off Hook	CallAnswered
CA_Ack	0330.023	CA_ACK,2001,200	Information Accepted	StableCall
CA_NotificationRequest	0332.838	CA_RQNT,1203, R: hu	Wait for Off Hook	StableCallWaiting
GW_Ack	0332.927	GW_ACK,1203,200	Command Accepted	StableCallArmed
GW_Notify	1565.367	GW_NTFY,2002, O: hu	On Hook	Disconnect
CA_Ack	1565.501	CA_ACK,2002,200	Information Accepted	Idle
CA_NotificationRequest	1572.492	CA_RQNT,1204, R: hd	Wait for Off Hook	IdleWaiting
GW_Ack	1572.612	GW_ACK,1204,200	Command Accepted	IdleReady

FIG 3F

<u>Time Stamp</u>	<u>Current Call Progress State</u>	<u>Current NGTN Control State</u>	<u>Current Analysis State</u>	<u>New Analysis State</u>
0000.123	Idle	IdleReady	Idle	Idle
0319.856	Idle	AlertingStart	Idle	CircuitReady
0319.947	Idle	Alerting	CircuitReady	AlertingReady
0320.000	Ring On	Alerting	AlertingReady	AlertingNormal
0322.000	Ring Off	Alerting	AlertingNormal	AlertingNormal
0326.000	Ring On	Alerting	AlertingNormal	AlertingNormal
0328.000	Ring Off	Alerting	AlertingNormal	AlertingNormal
0329.455	Answer	Alerting	AlertingNormal	StopRinging
0329.571	Answer	Off Hook	StopRinging	RingingStopped
0330.023	Answer	StableCall	RingingStopped	StableCallWaiting
0331.455	Stable Call	StableCall	StableCallWaiting	ValidCall
0332.838	Stable Call	StableCallWaiting	ValidCall	DisconnectWaiting
0332.927	Stable Call	StableCallArmed	DisconnectWaiting	DisssconnectArmed
1565.100	Station On Hook	StableCallArmed	DisssconnectArmed	Disconnect
1565.367	Station On Hook	Disconnect	Disconnect	CallClearing
1565.501	Station On Hook	Idle	CallClearing	ValidEndOfCall
1572.492	Station On Hook	IdleWaiting	ValidEndOfCall	ResetStart
1572.612	Station On Hook	IdleReady	ResetStart	Idle

FIG 3G

<u>Time Stamp</u>	<u>Current Call Progress State</u>	<u>Current NGTN Control State</u>	<u>Current Analysis State</u>	<u>New Analysis State</u>
0000.123	Idle	IdleReady	Idle	Idle
0319.856	Idle	AlertingStart	Idle	CircuitReady
0319.947	Idle	Alerting	CircuitReady	AlertingReady
0321.949	Idle	Alerting	AlertingReady	AlertTimeOut
0323.949	Idle	Alerting	AlertTimeOut	GW_ErrNoRinging
0353.955	Idle	Disconnect	GW_ErrNoRinging	CallCancel
0354.129	Idle	Idle	CallCancel	InvalidCall
0363.013	Idle	IdleWaiting	InvalidCall	ResetStart
0363.131	Idle	IdleReady	ResetStart	Idle

FIG 3H

Circuit Associated Signaling and ISDN Call Processor Implementation

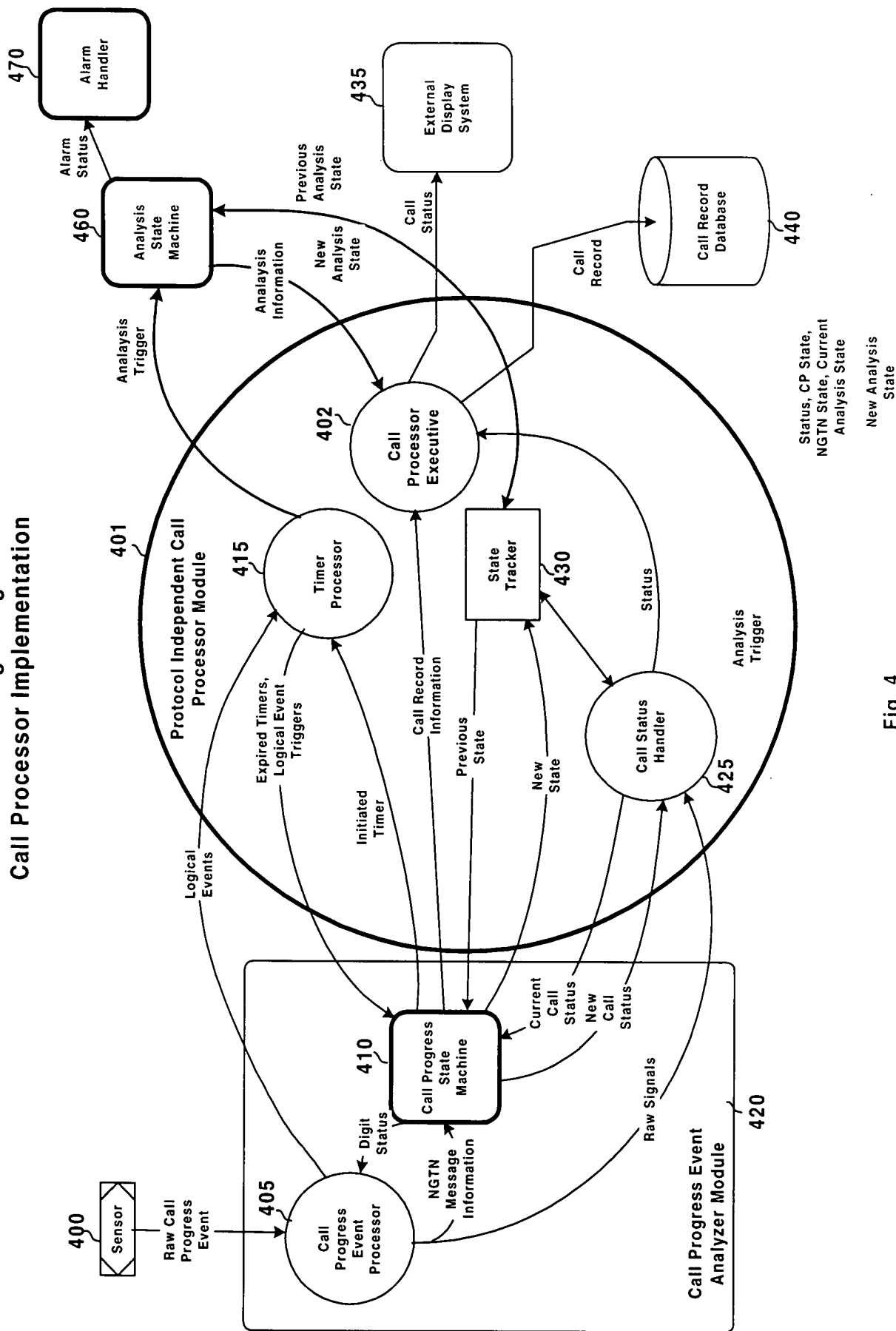


Fig. 4

NGTN Call Processor Implementation

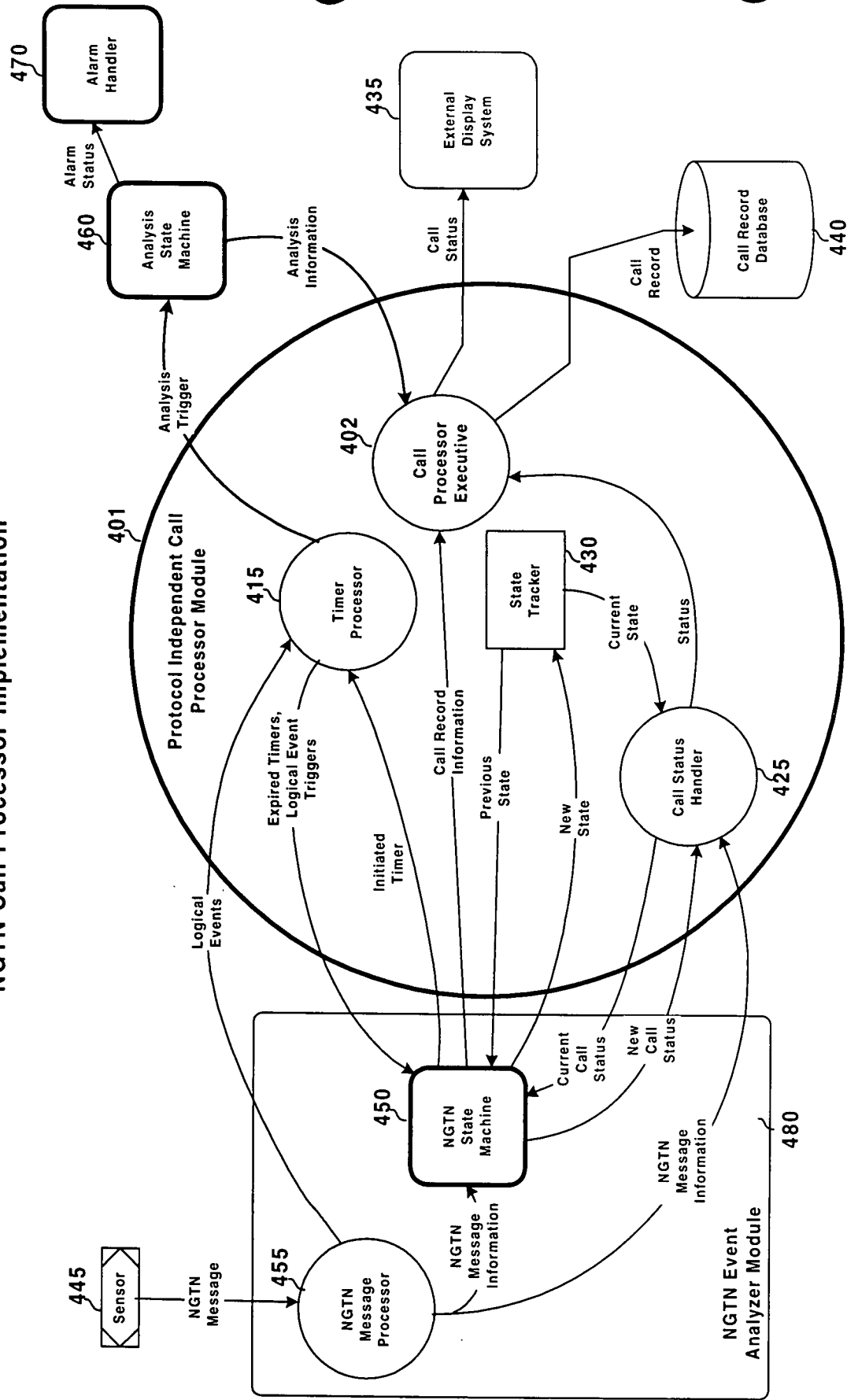


Fig. 4A

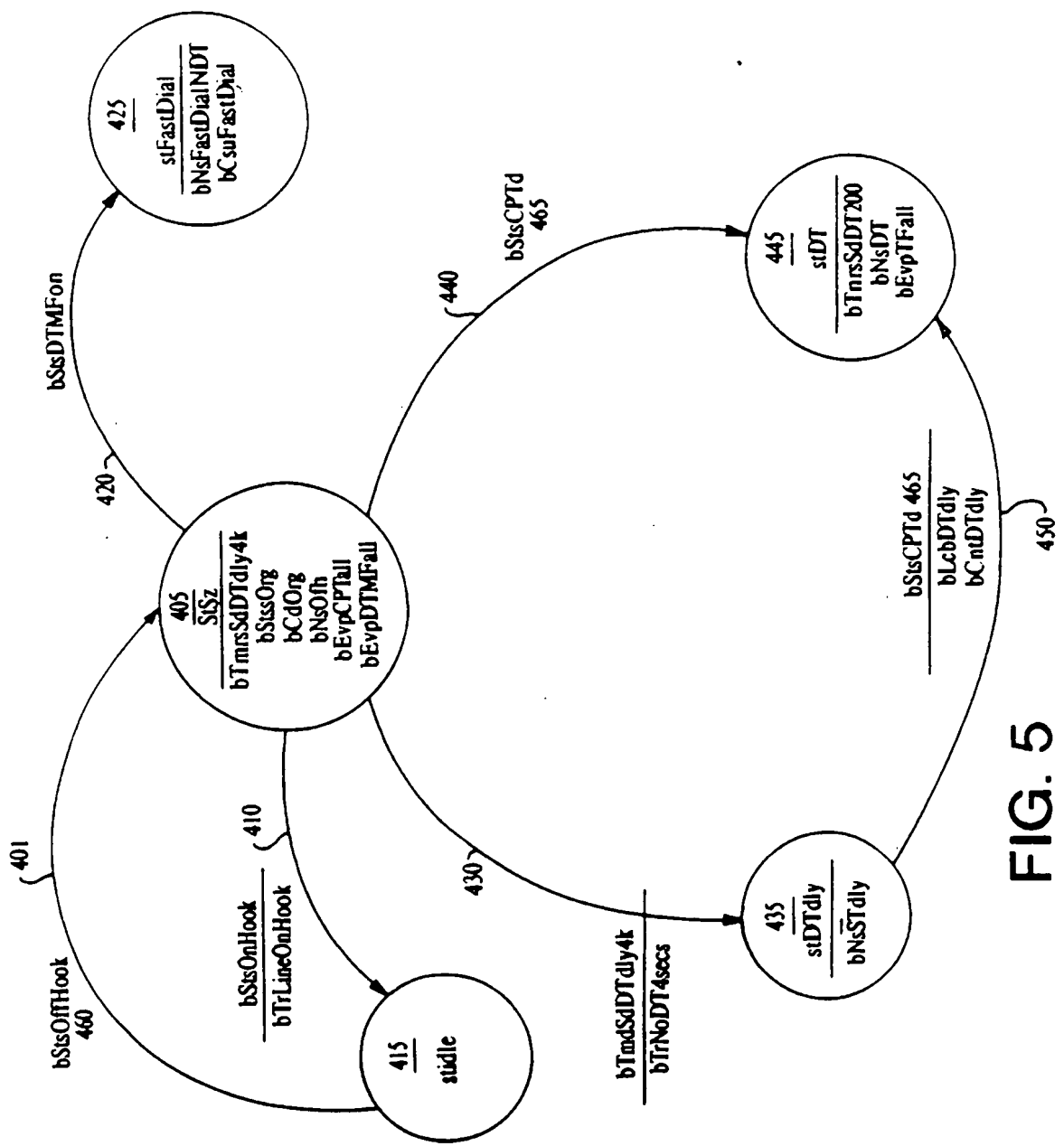


FIG. 5

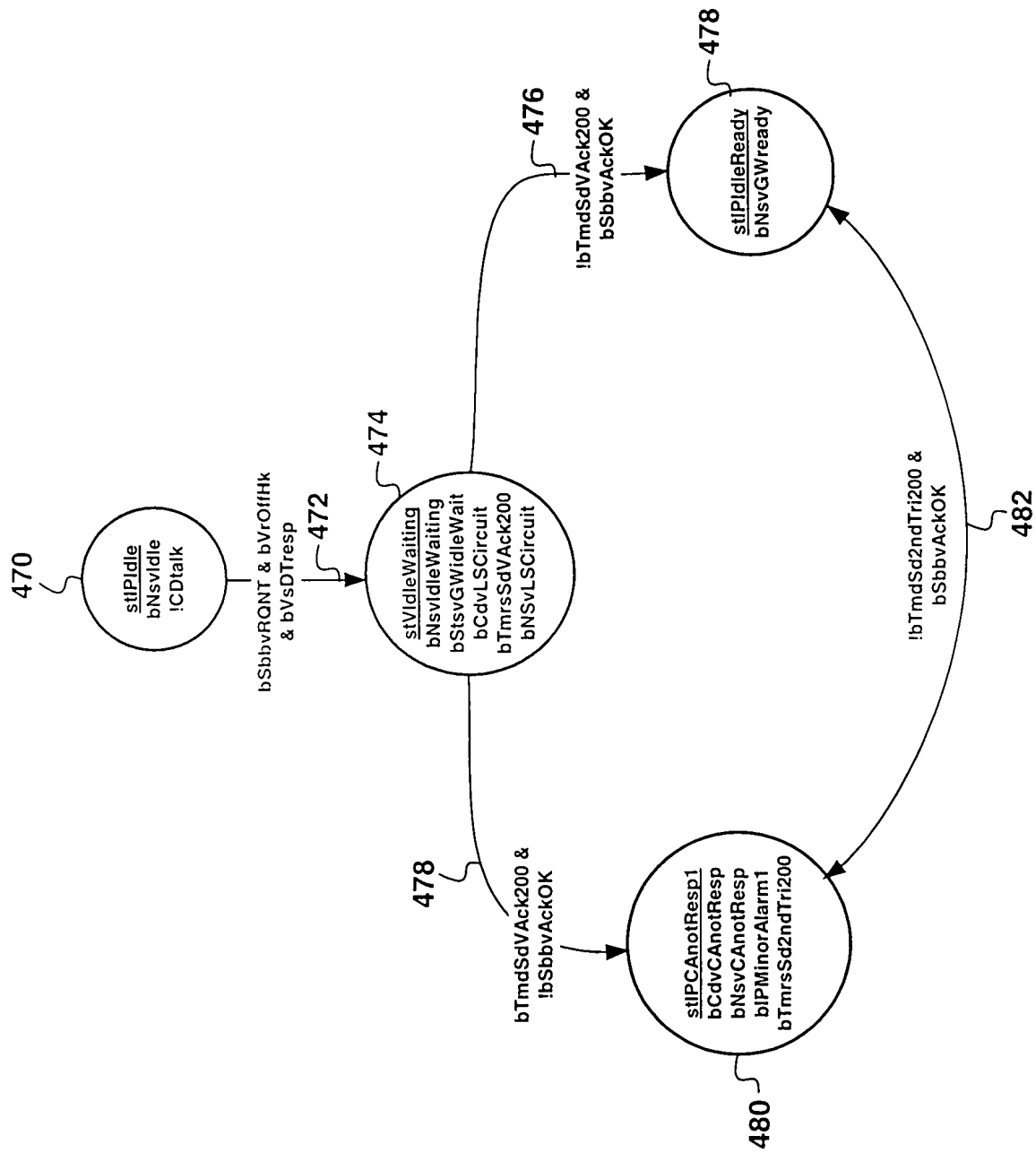


Fig 5A

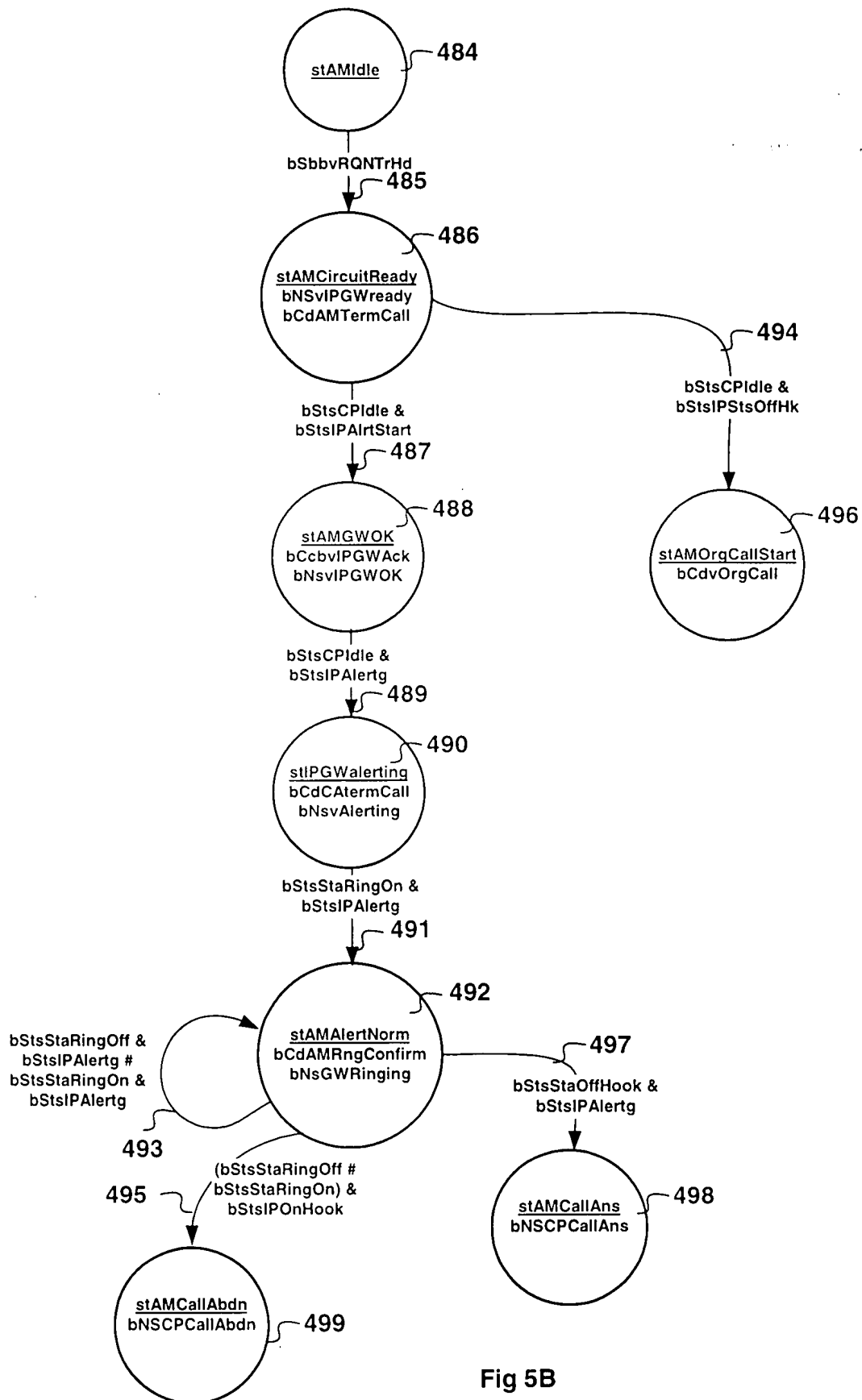
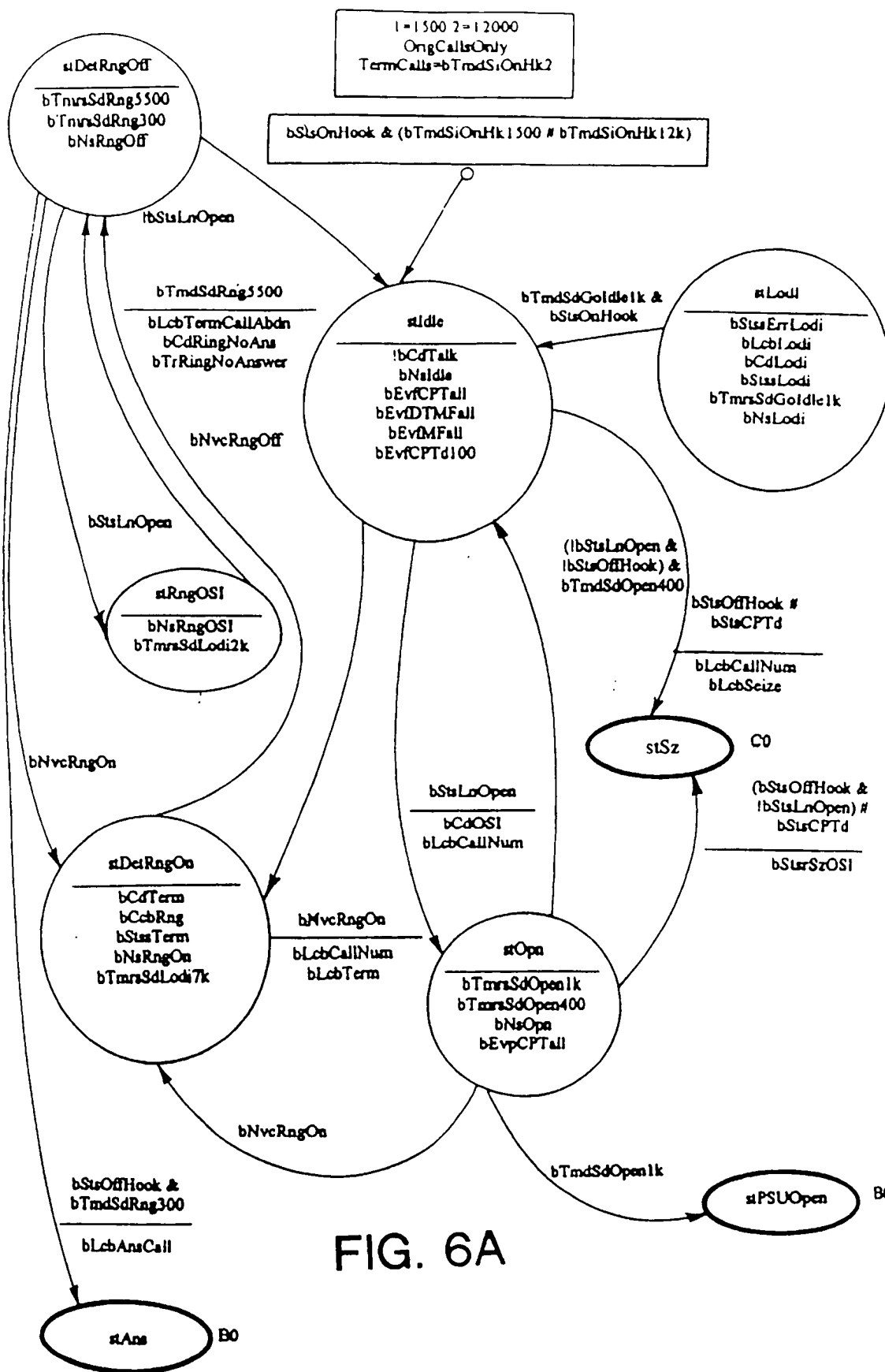


Fig 5B



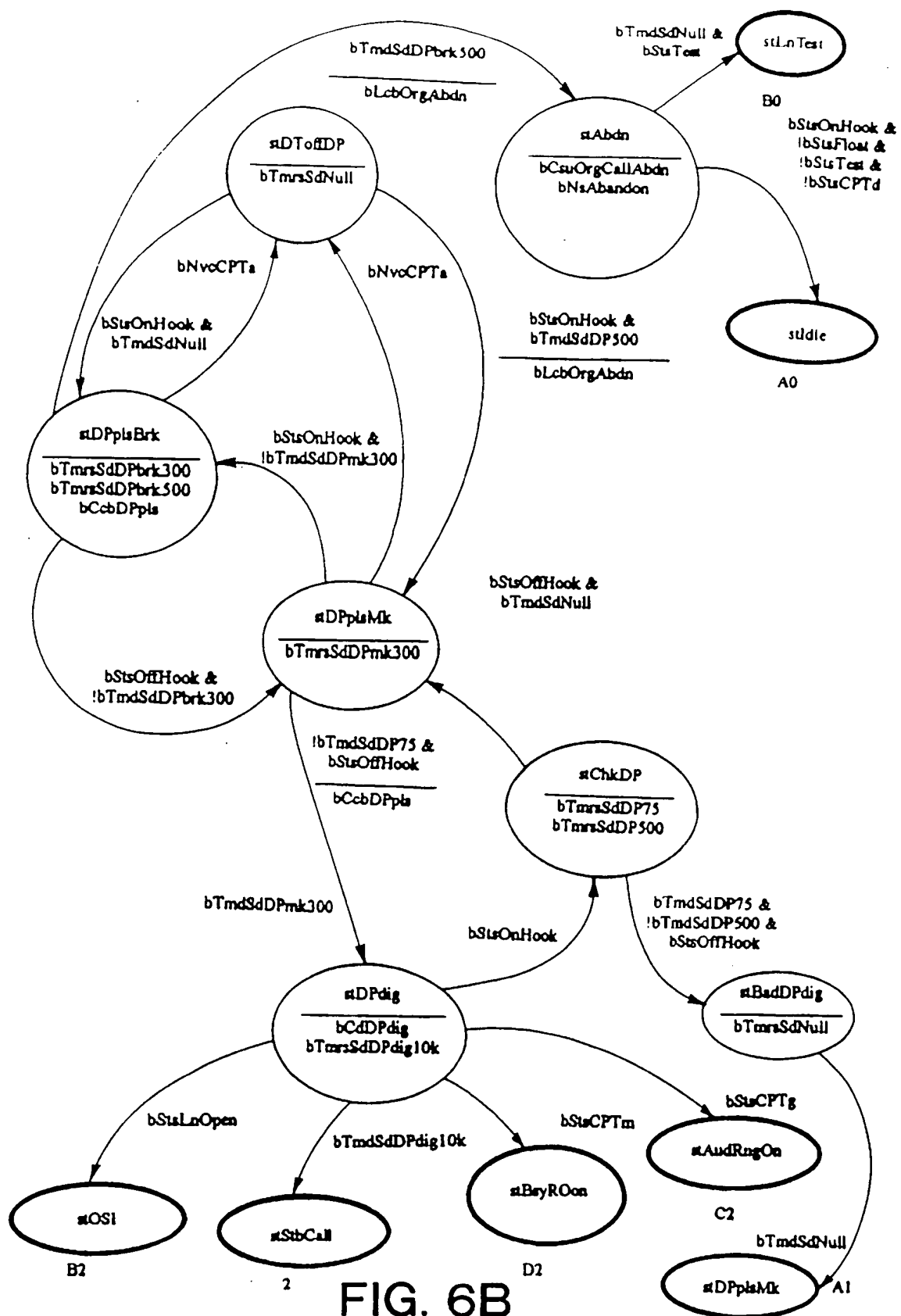


FIG. 6B

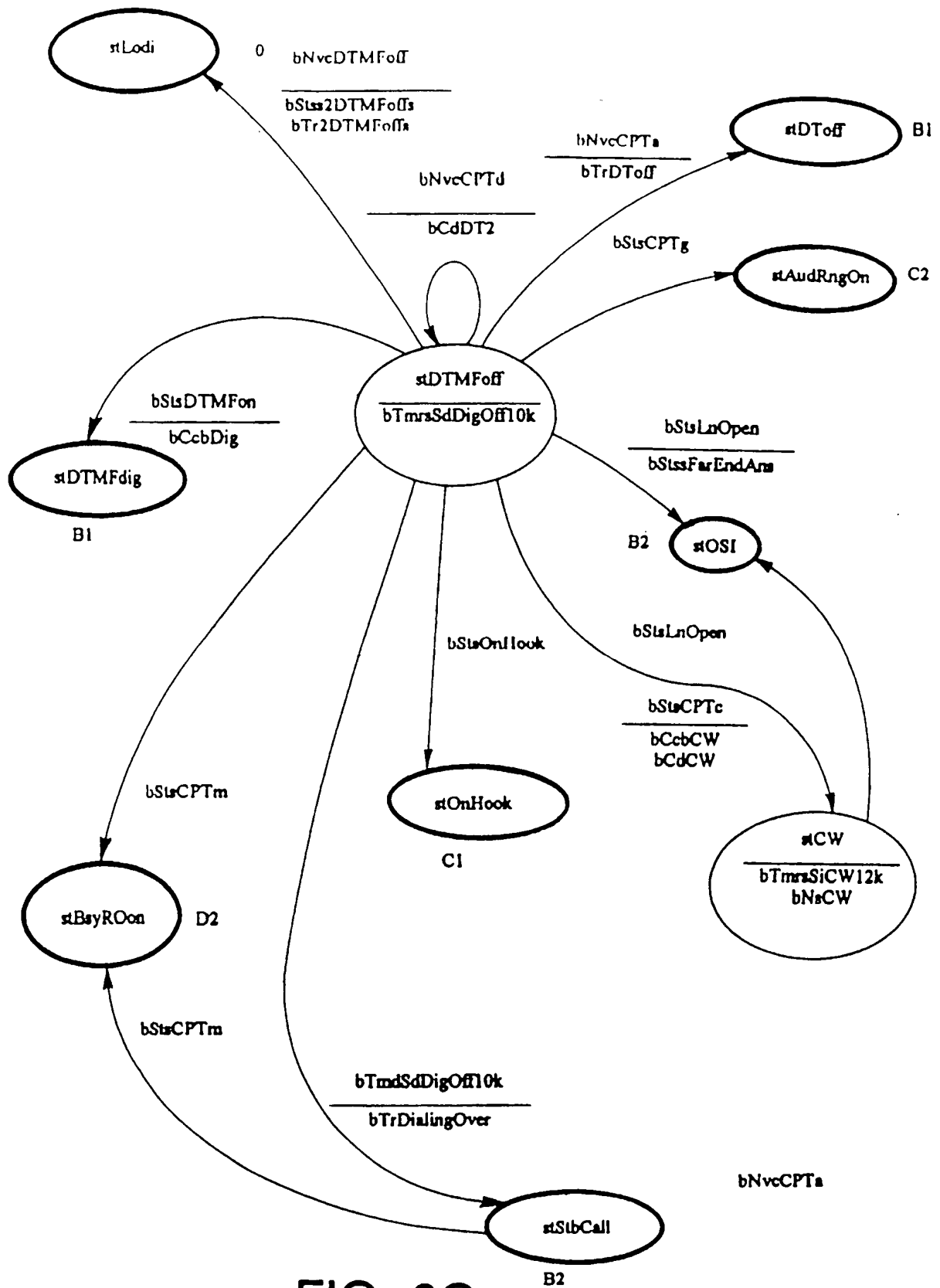


FIG. 6C

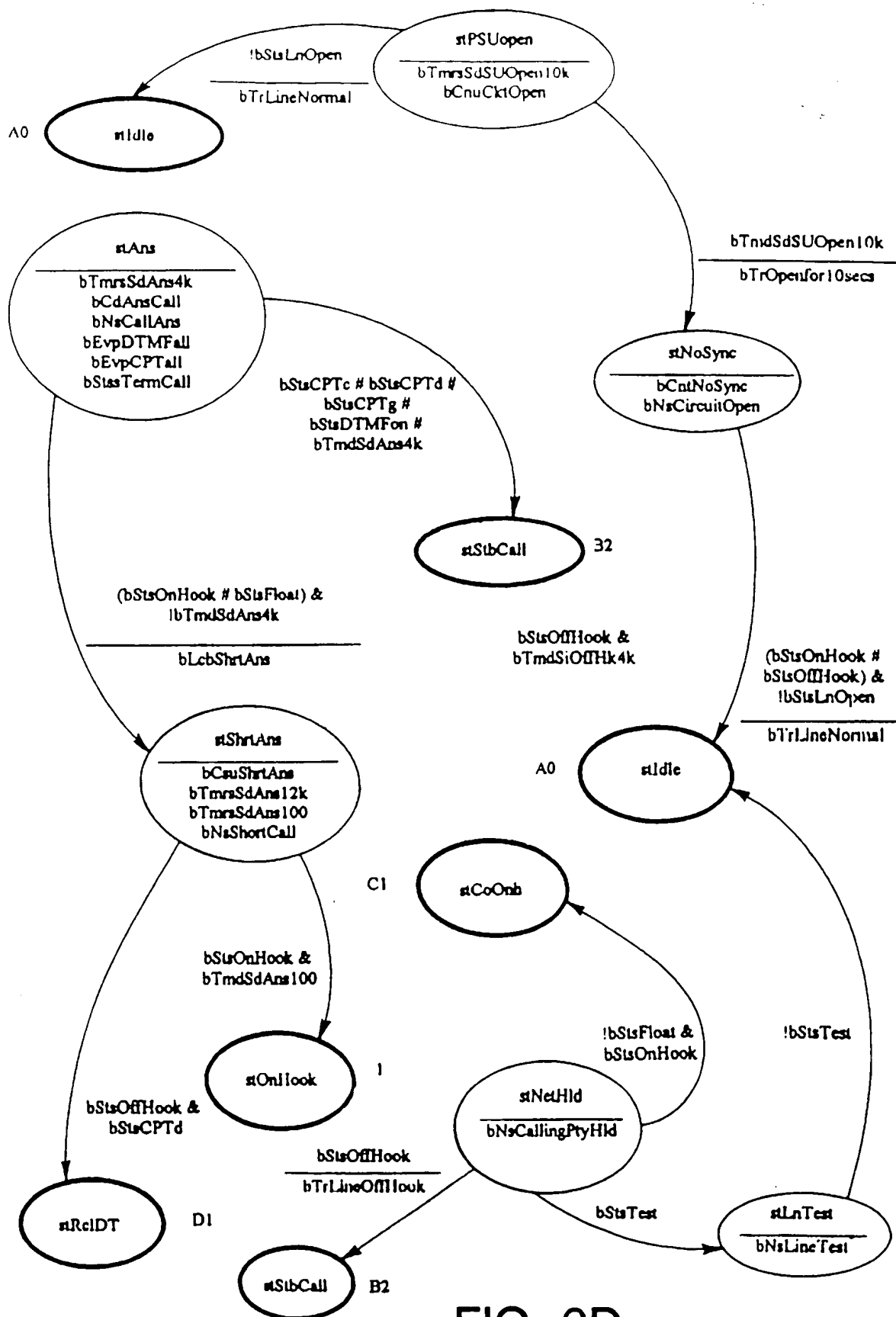


FIG. 6D

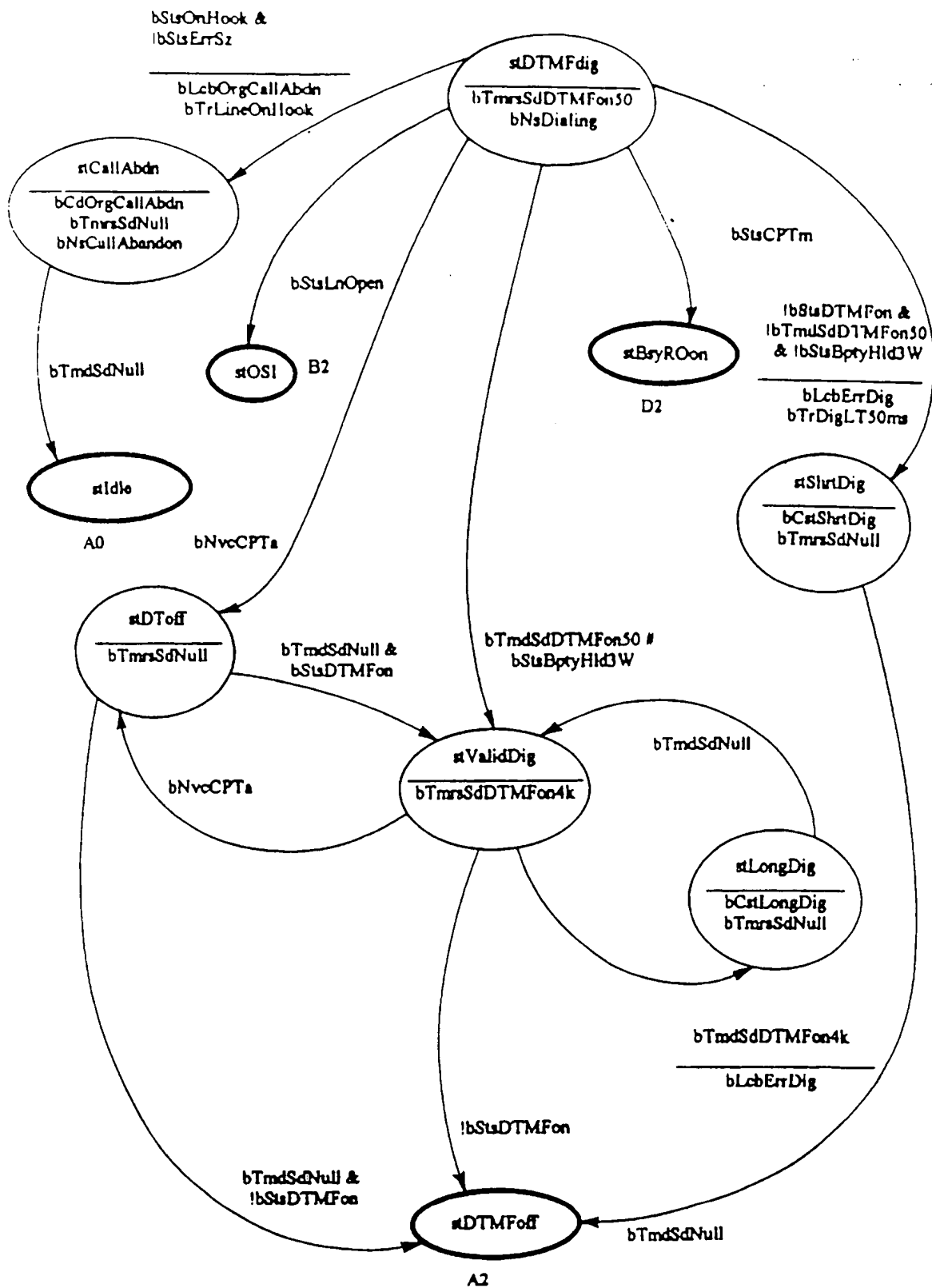


FIG. 6E

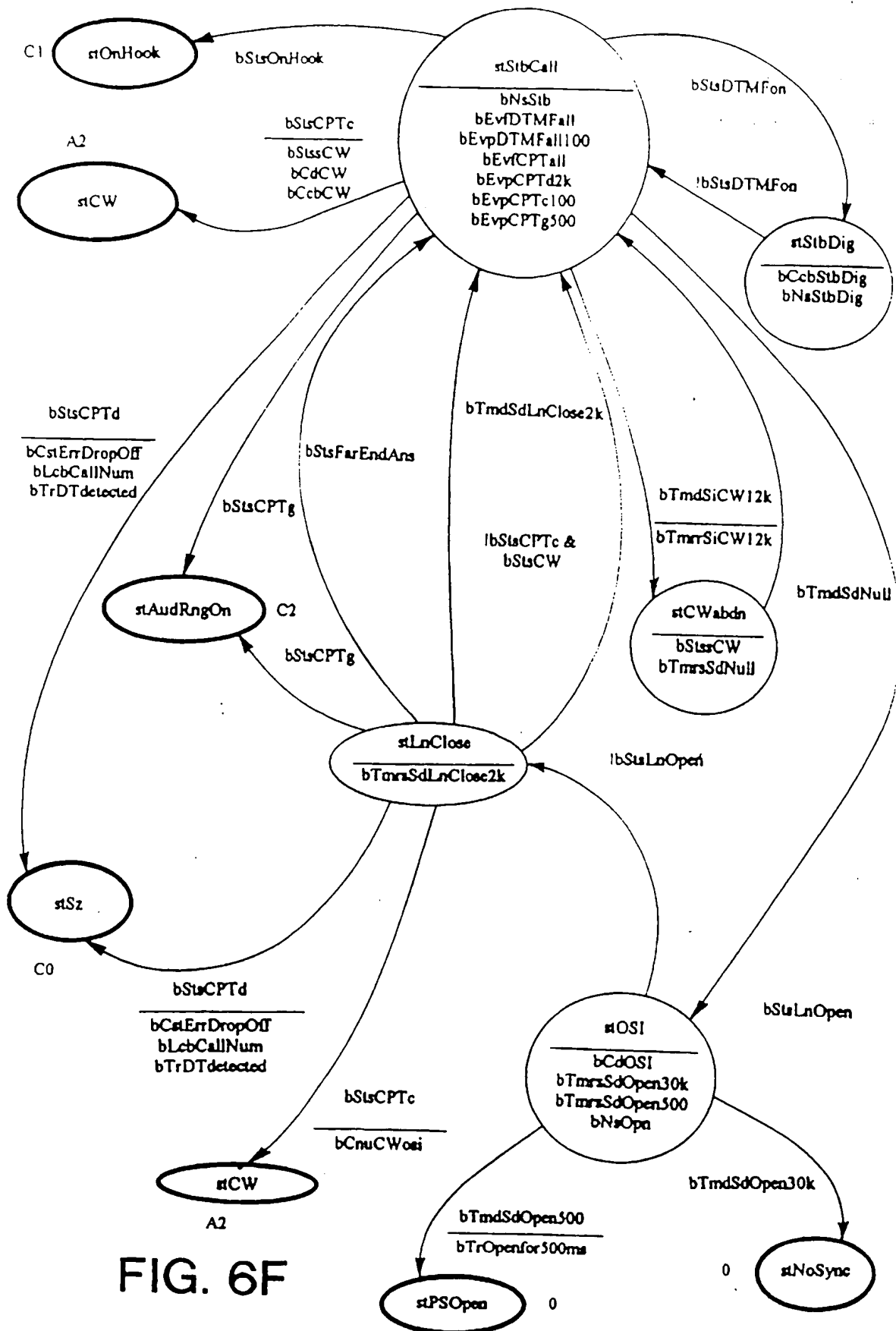


FIG. 6F

Originating Call

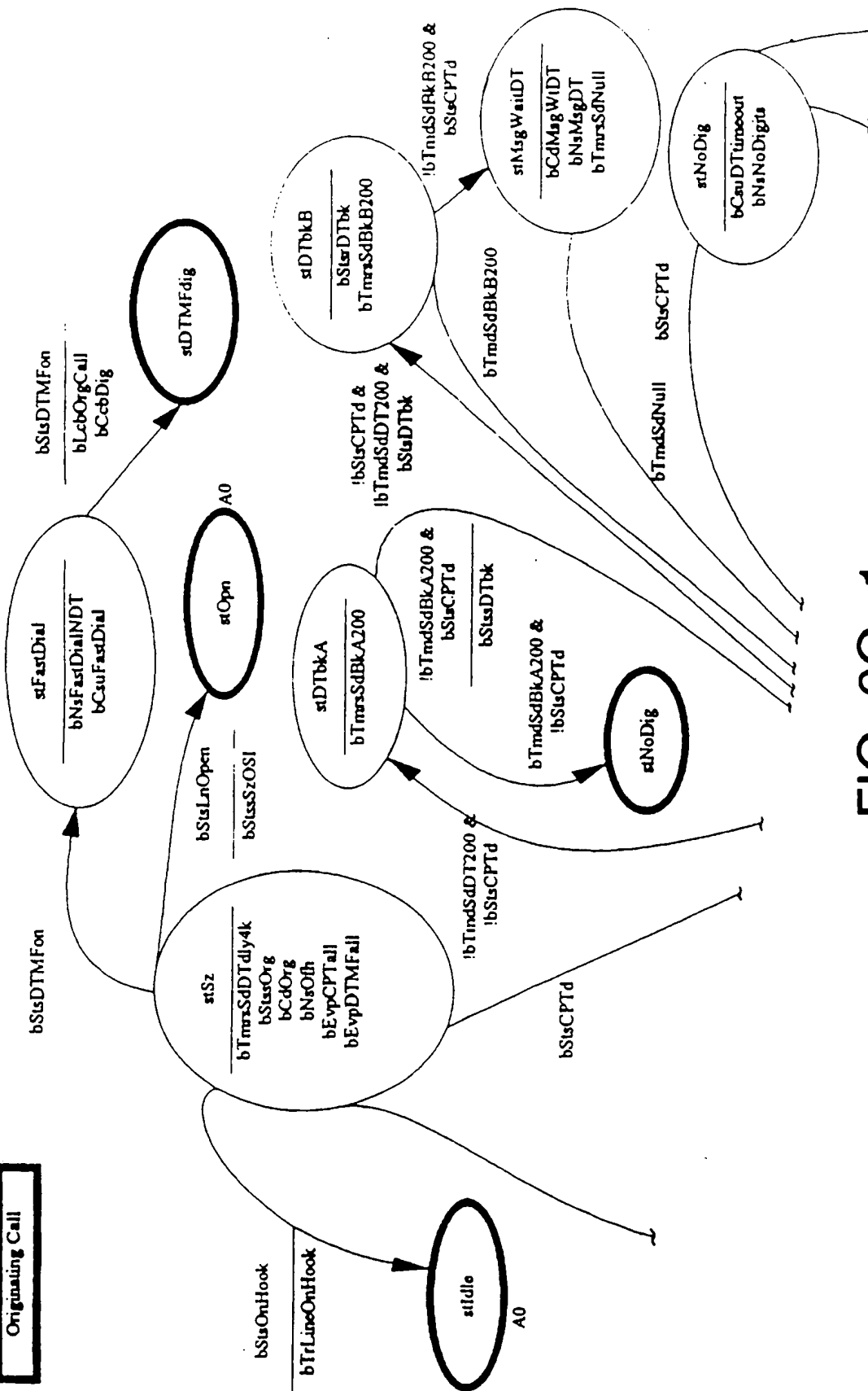
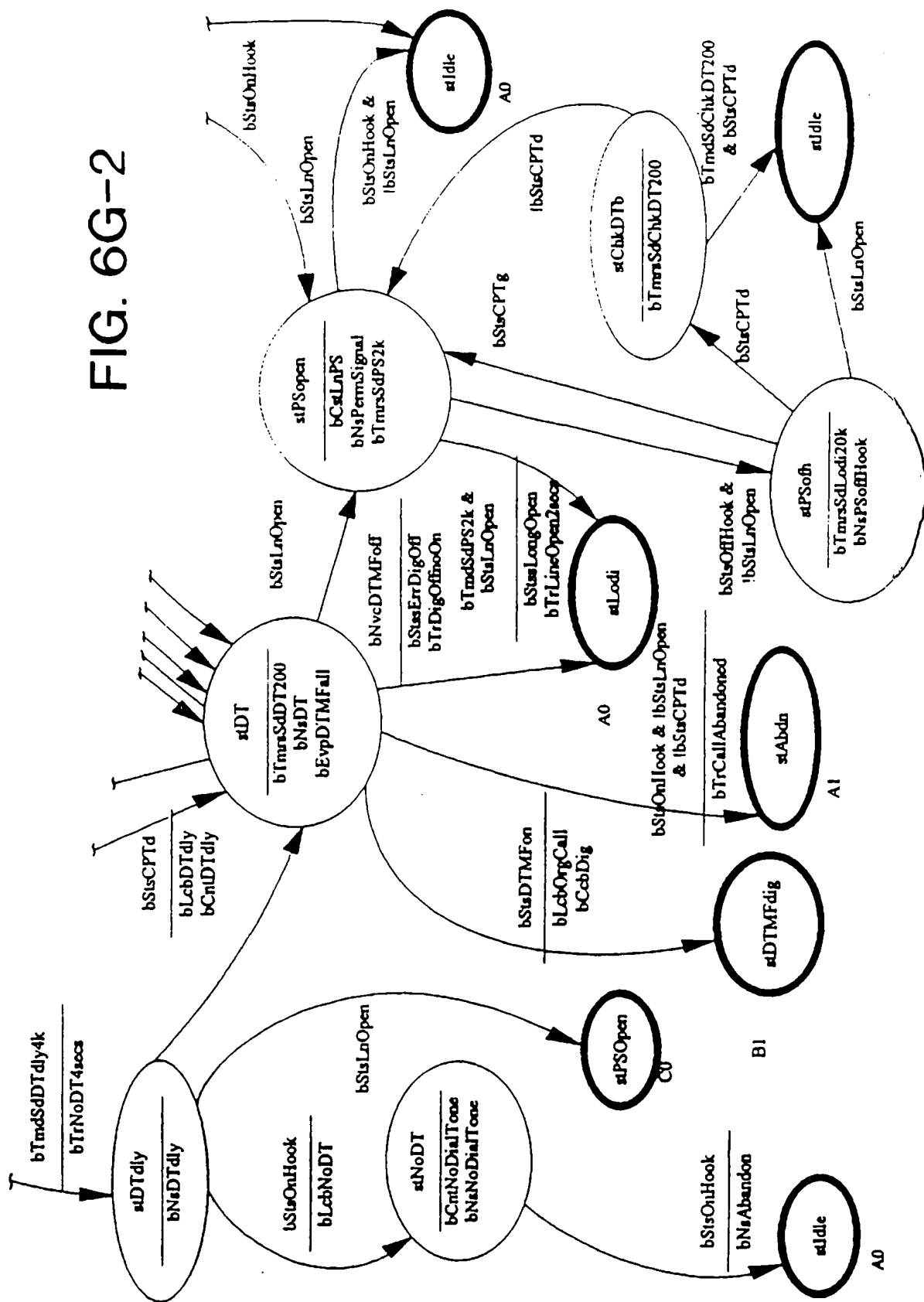
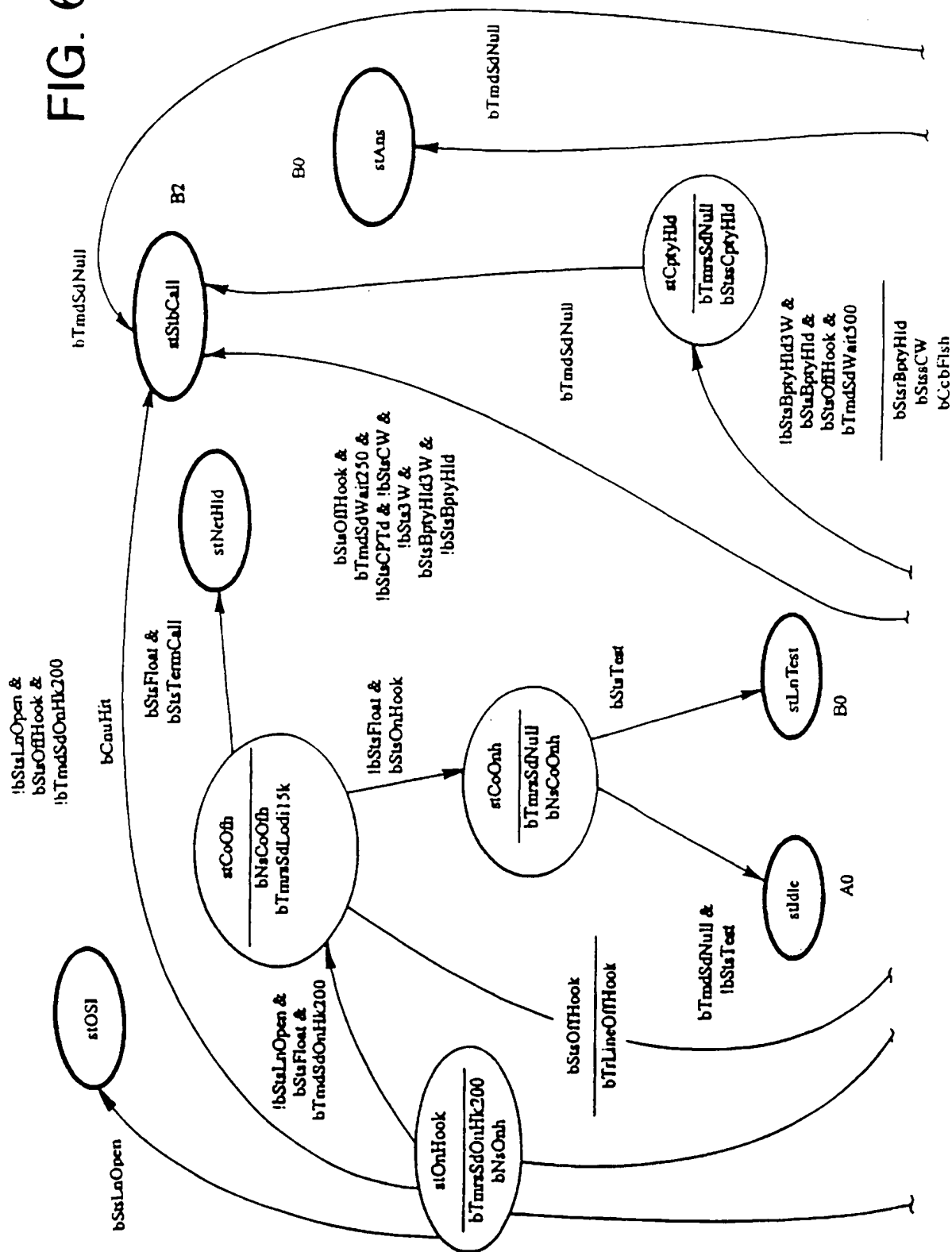
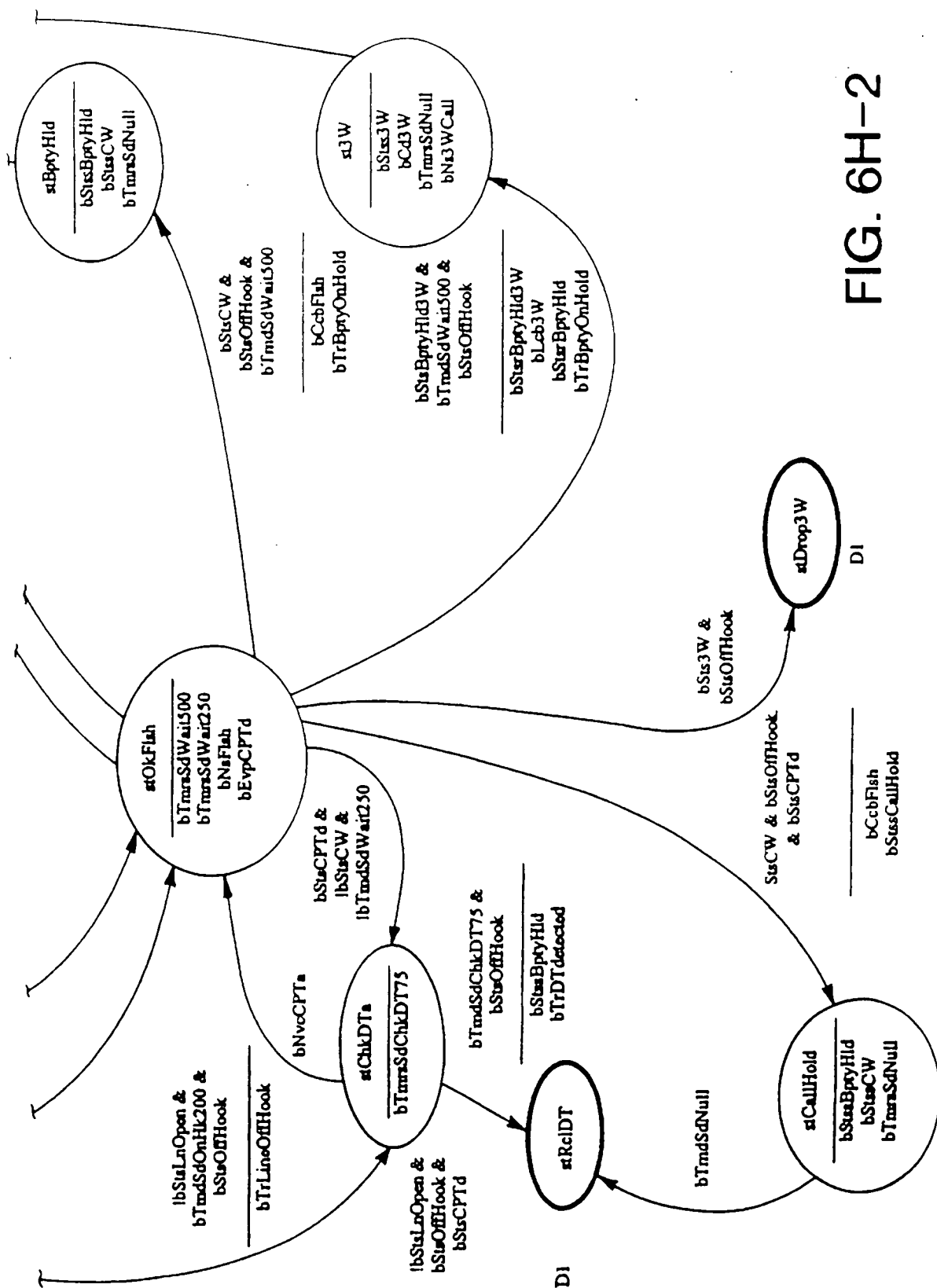
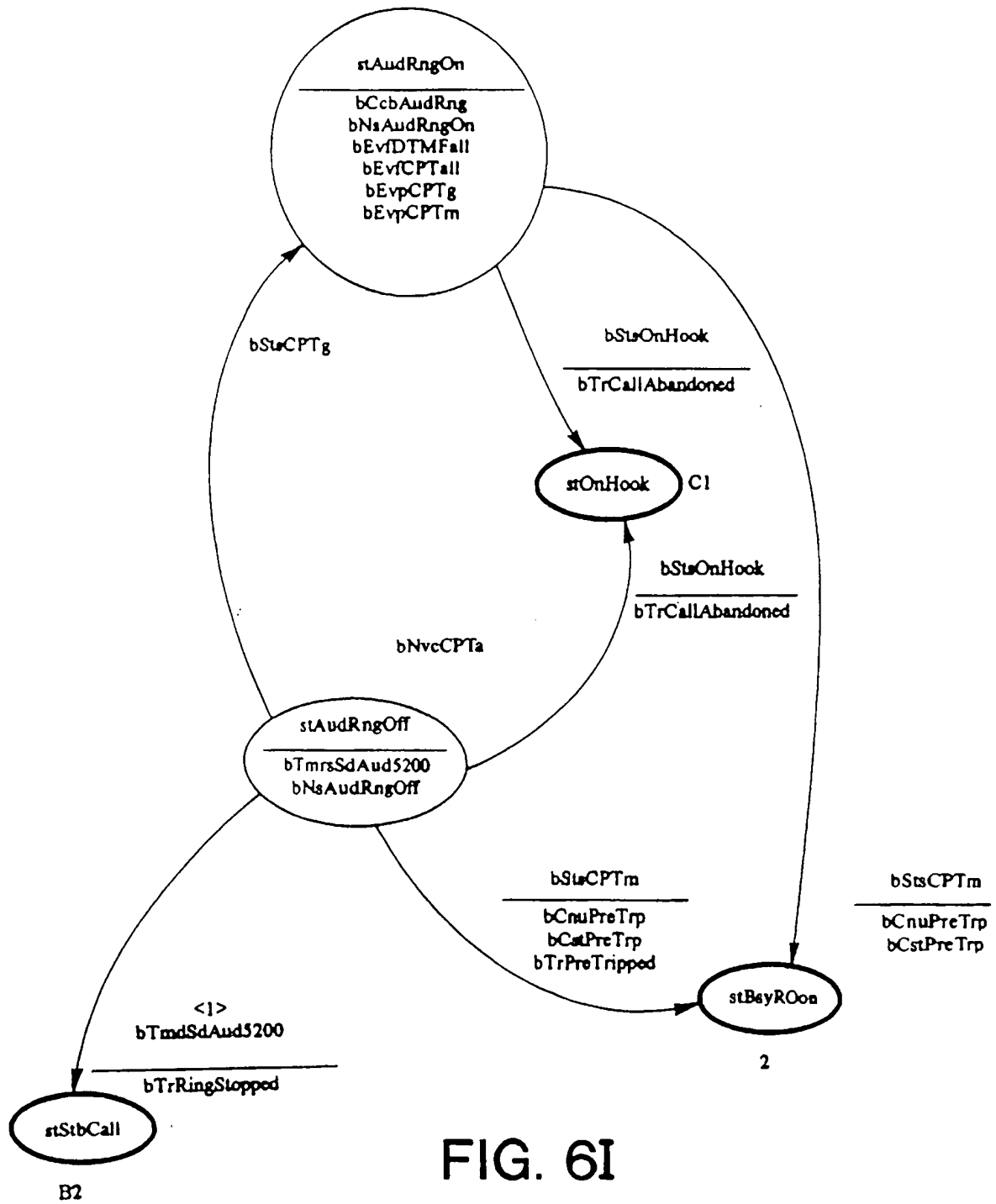


FIG. 6G-1









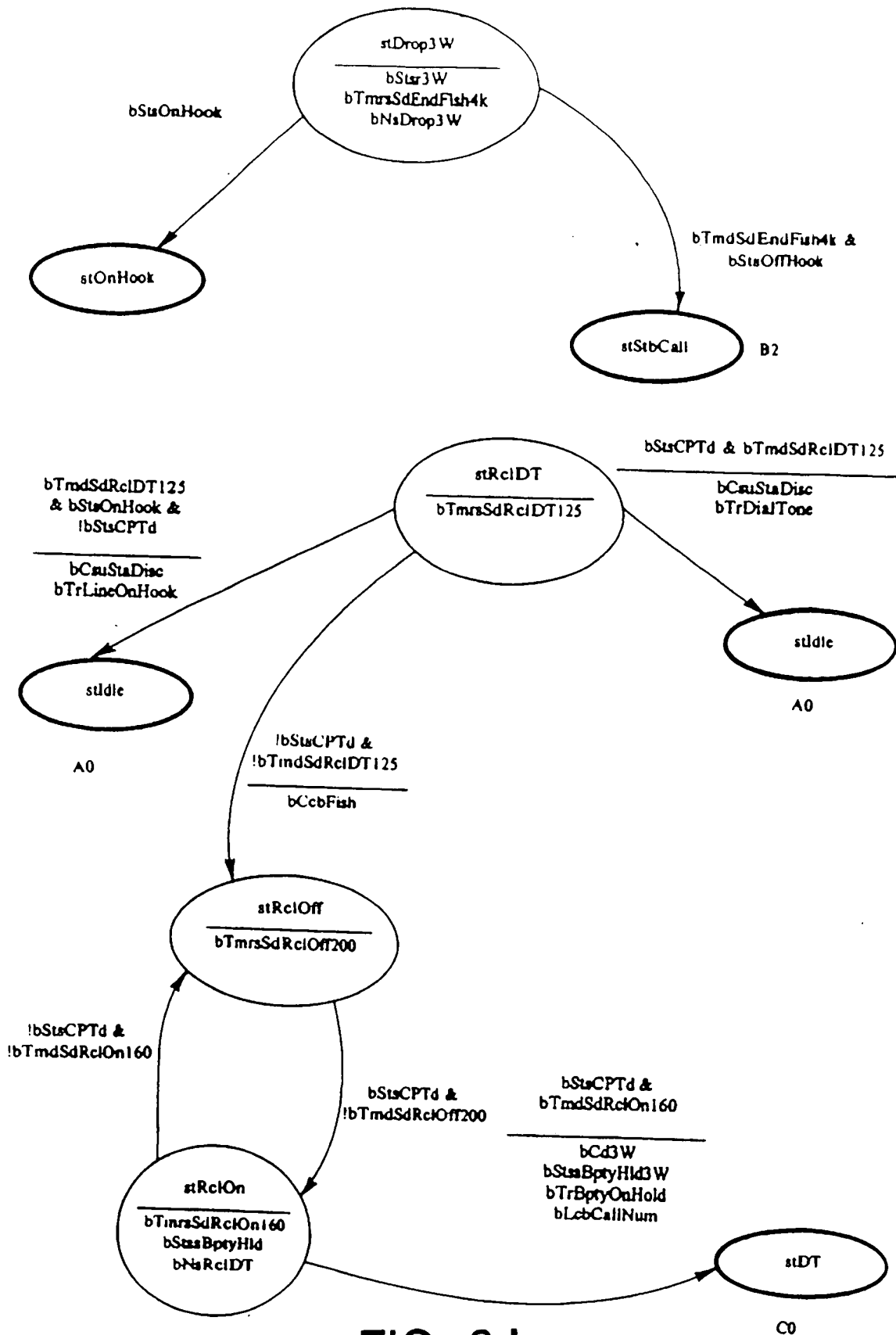


FIG. 6J

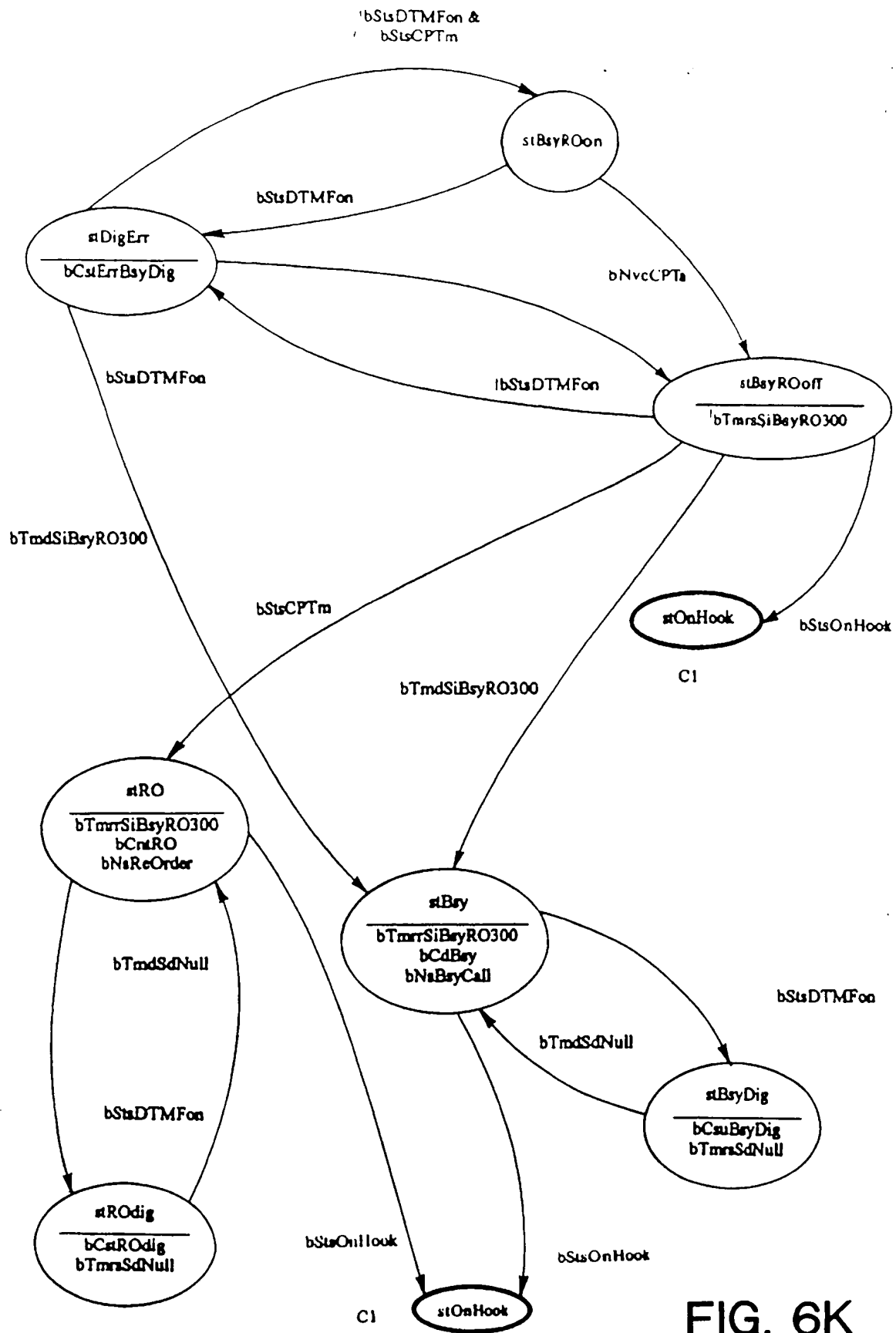


FIG. 6K

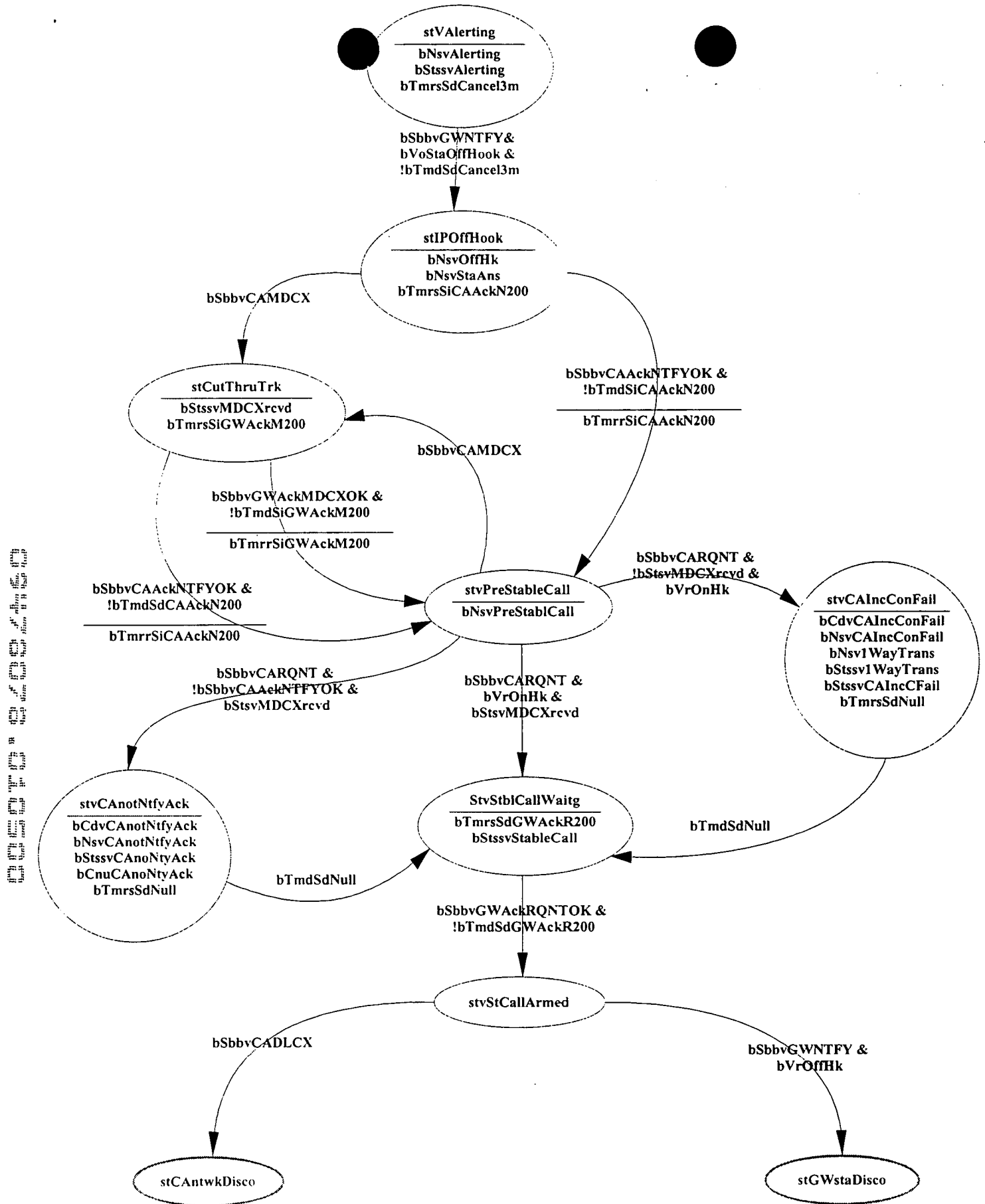


FIG. 6M

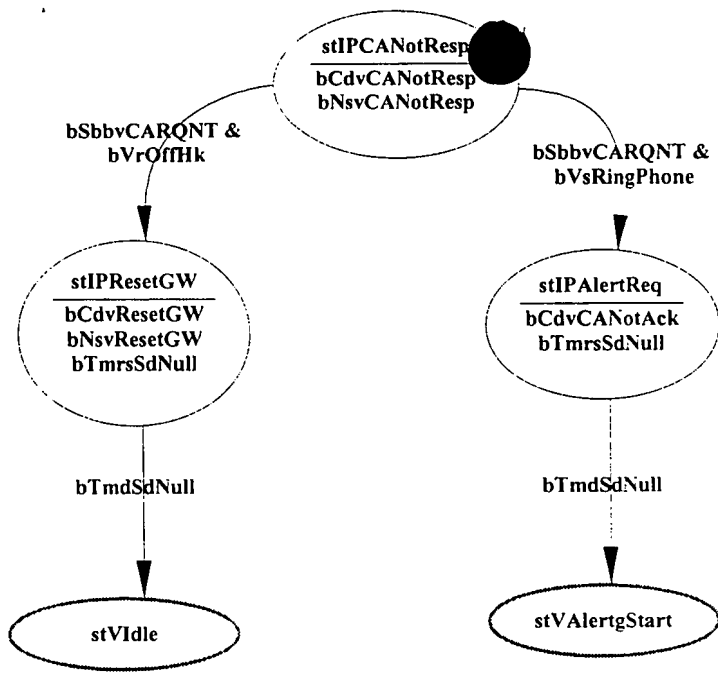


FIG. 6N



FIG. 60

bDig0T
 bDig00T
 bDig1t7
 bDigxxx
 bDig8xxxxxx
 bDigPxxxxxx
 bDigAxx
 bDig91xxxxxx
 bDig9011xT

CRCX 1204 endpoint-1@rgw-2567.whatever.net
 SSCP 1.1
 C: A3C47F21456789F0
 L: p:10, a:G.711;G.726-32
 M: recvnly

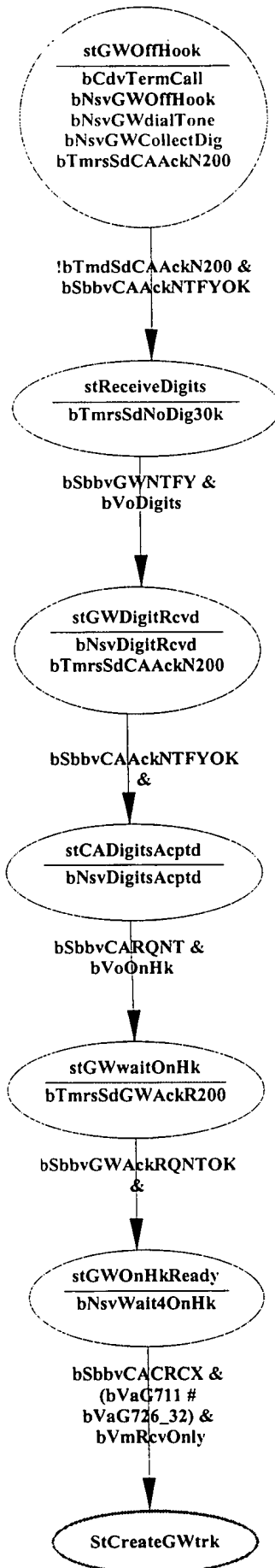


FIG. 6P

MDCX 1,206 endpoint-1@rgw-2567.whatever.net SGCP 1.1
 C: A3C47F21456789F0
 I:FDE234C8
 M: recvonly

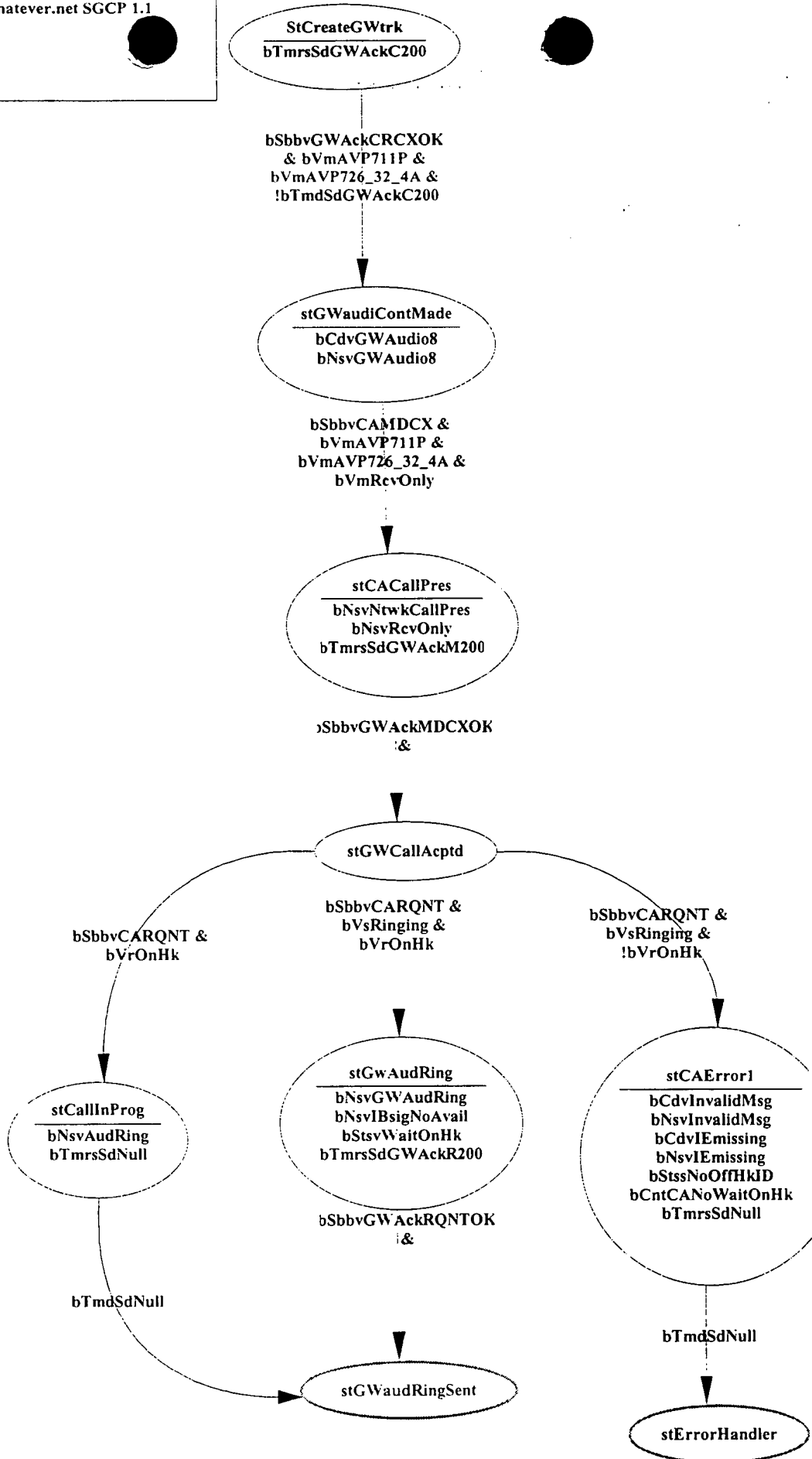


FIG. 6Q

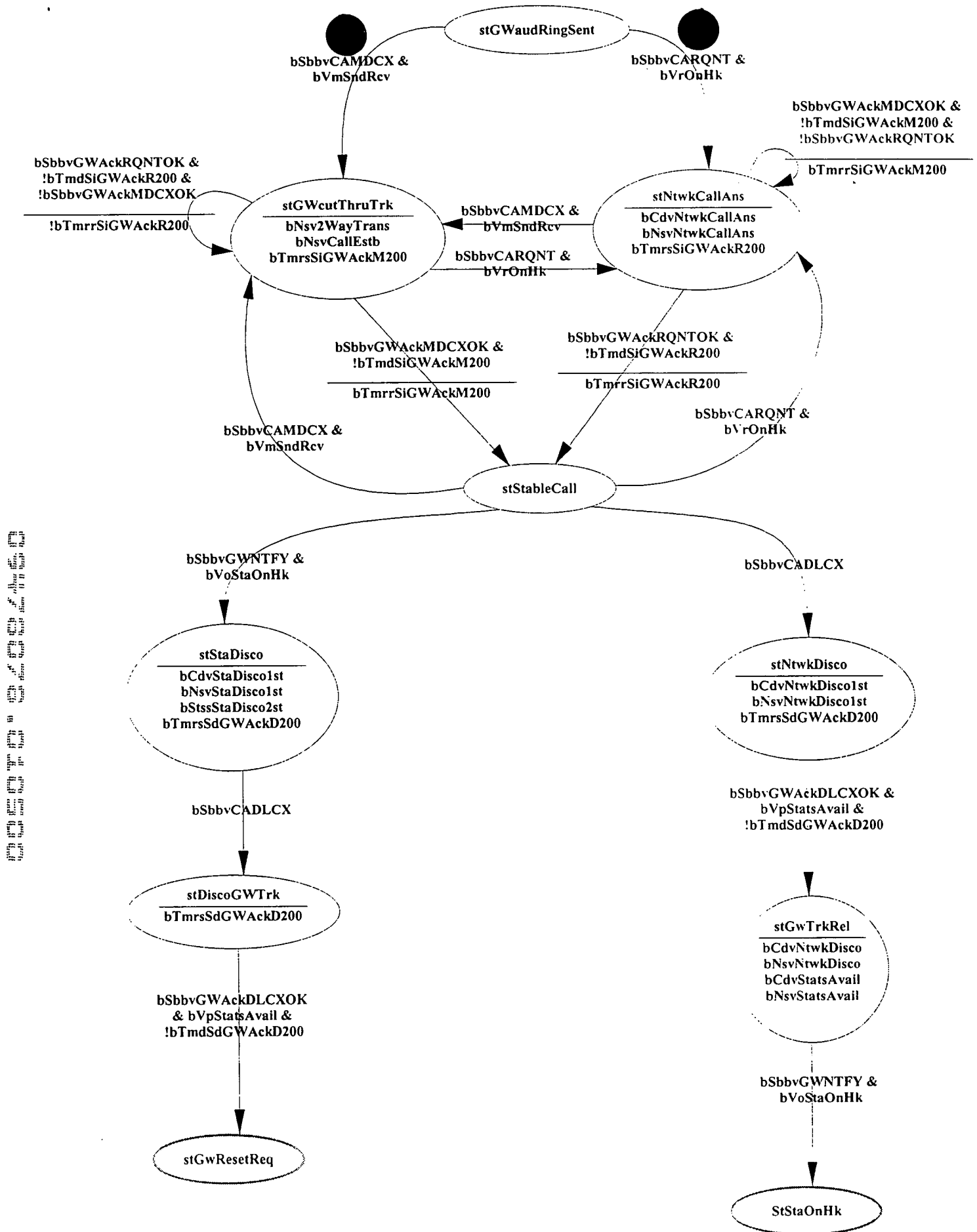
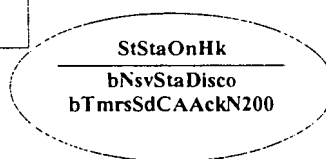
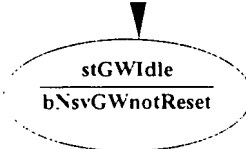


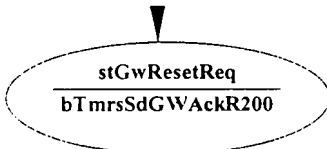
FIG. 6R



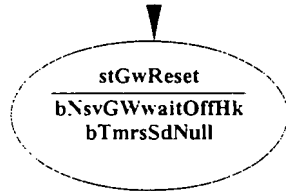
bSbbvCAAckNTFYOK &
!bTmdSdCAAckN200 &
!bStsStaDisco1st



bSbbvCARQNT &
bVrStaOffHk



bSbbvGWackRQNTOK &
!bTmdSdGWackR200



bTmdSdNull

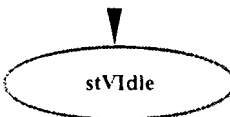


FIG. 6S

Trigger Events:
Sbb, Nvc or Tmd

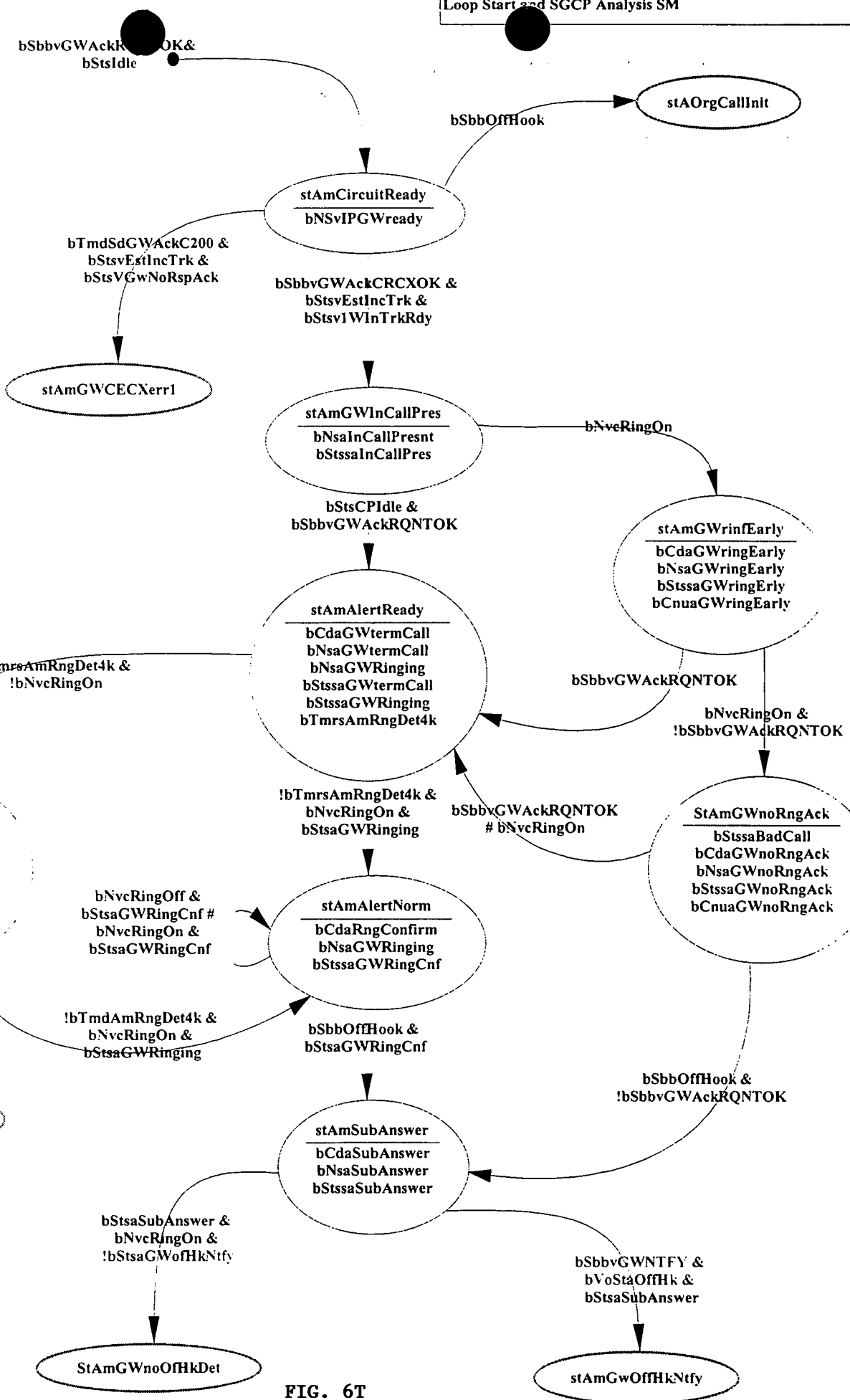


FIG. 6T

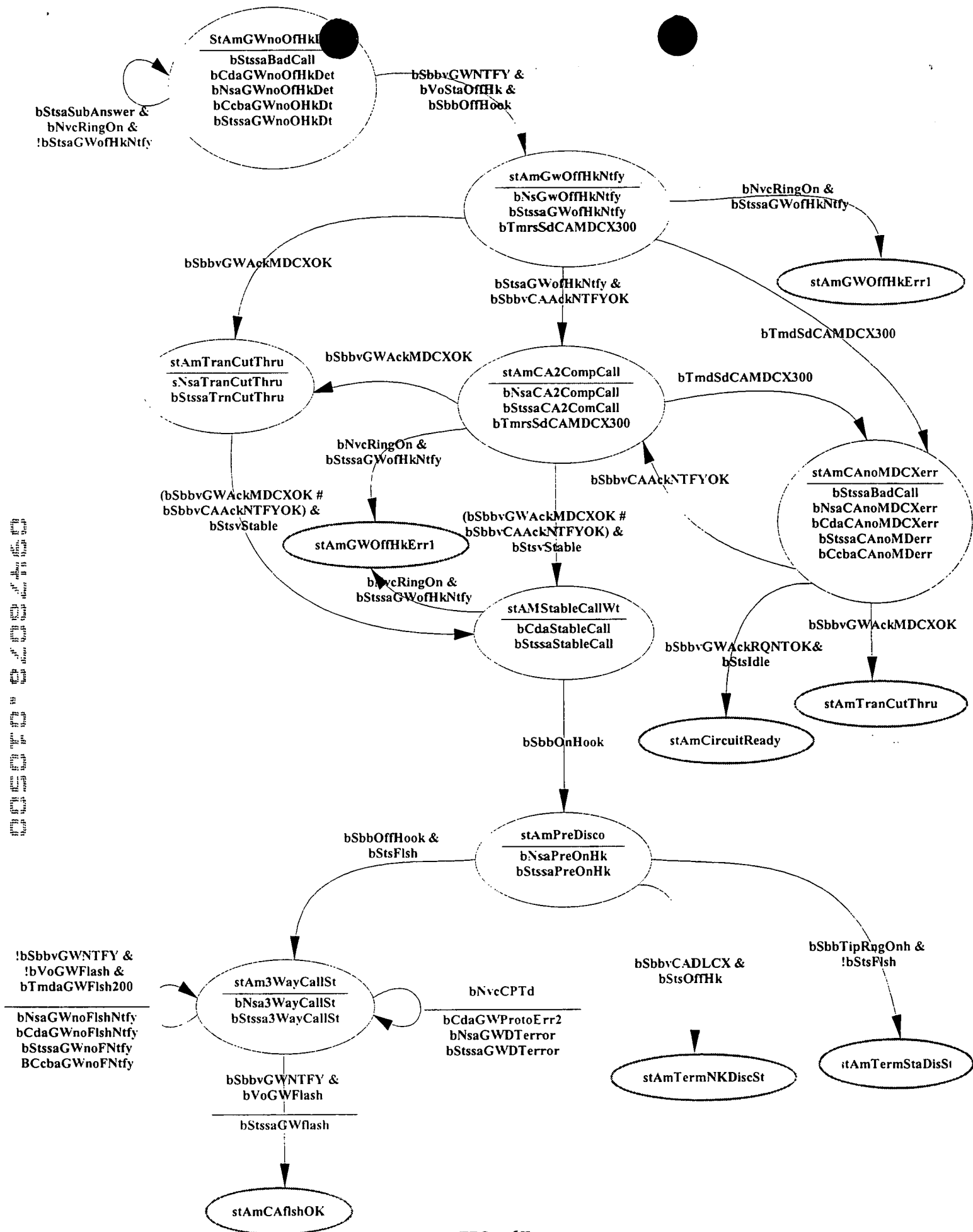


FIG. 6U

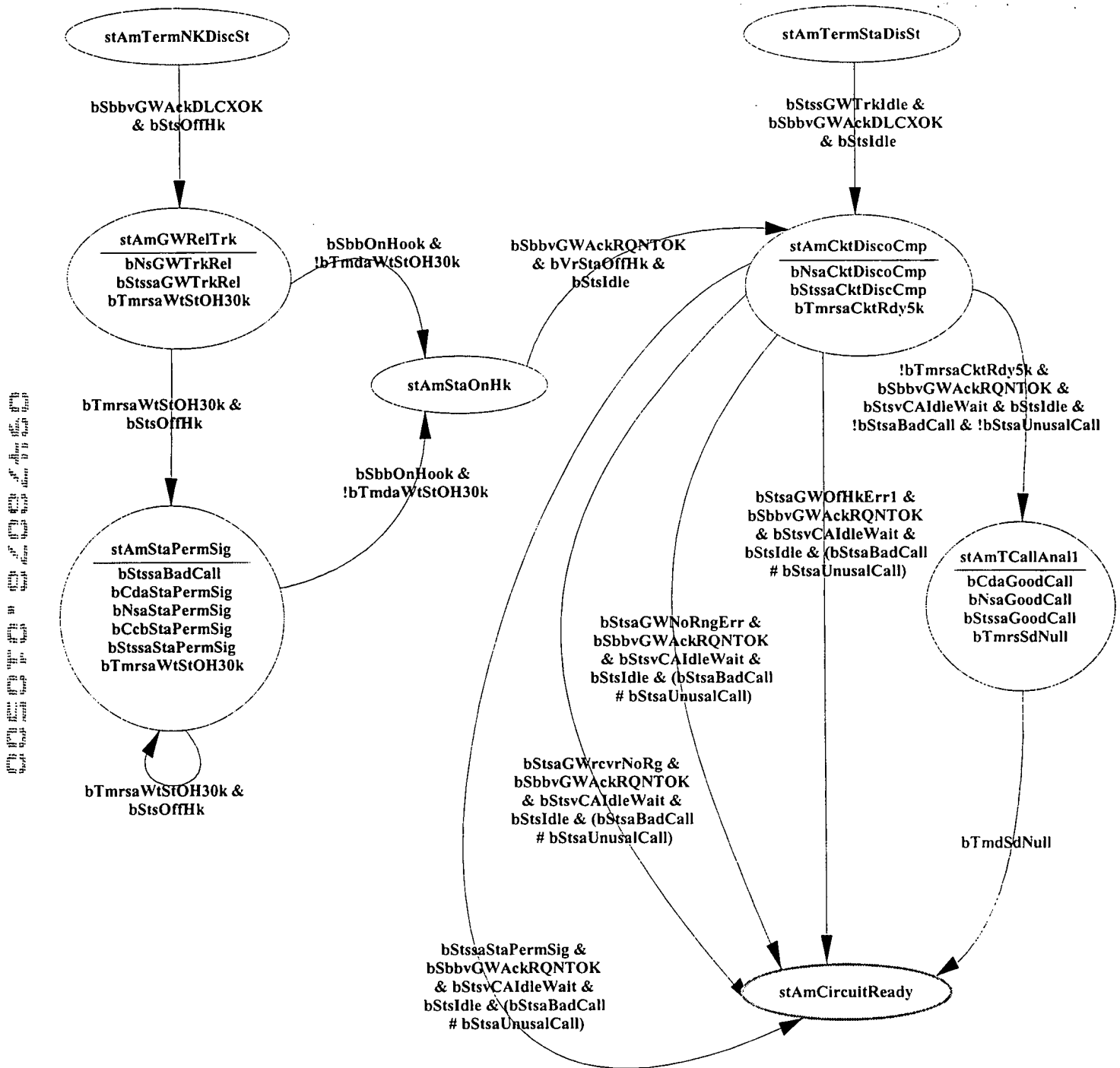


FIG. 6V

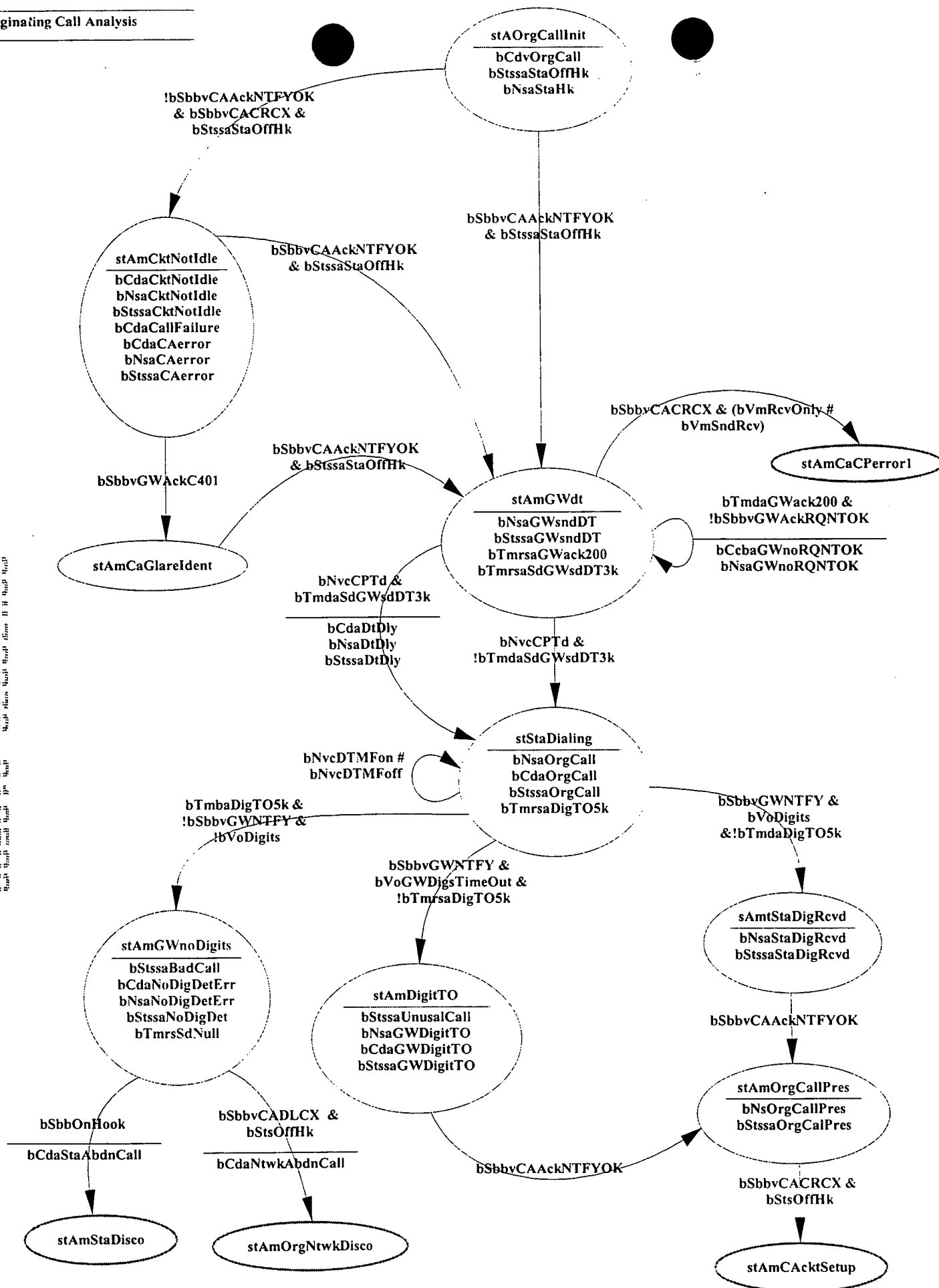


FIG. 6W

Terminating Call Errors

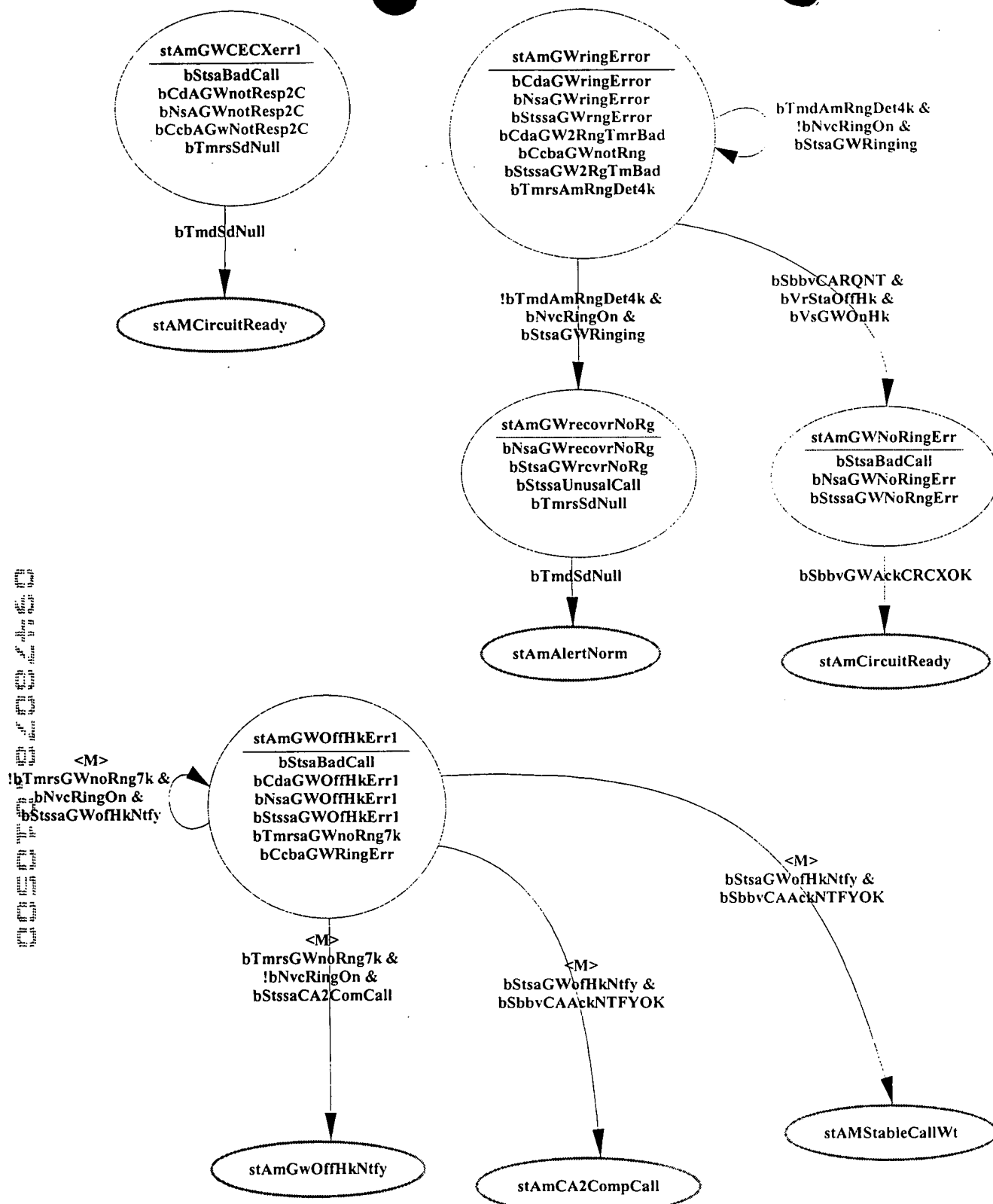


FIG. 6Z

FIG. 6Z1 is a flowchart illustrating the process of handling originating call errors. The process begins with a state 'stAmCaCPerror1' and transitions through various error states based on the value of 'bSbbvGWackC400'. If 'bSbbvGWackC400' is true, the process transitions to 'stAmGWrejCRCX'. If 'bSbbvGWackC400' is false, the process transitions to 'stAmGWdt'.

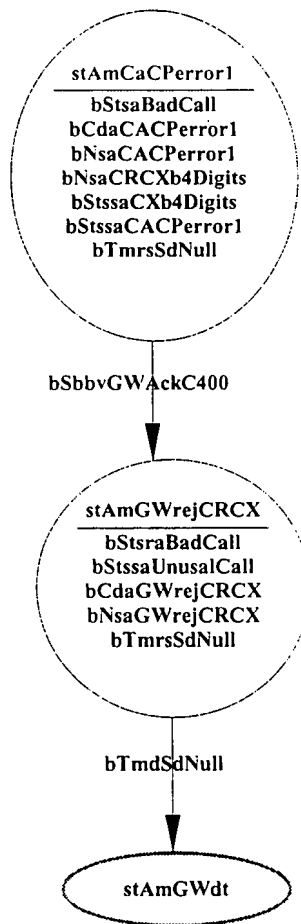


FIG. 6Z1

FIG. 7 is a schematic diagram of a telephone system showing a telephone connected to a PBX, which is connected to a C.O. (Central Office) and a Trunk line leading to a PSTN (Public Switched Telephone Network).

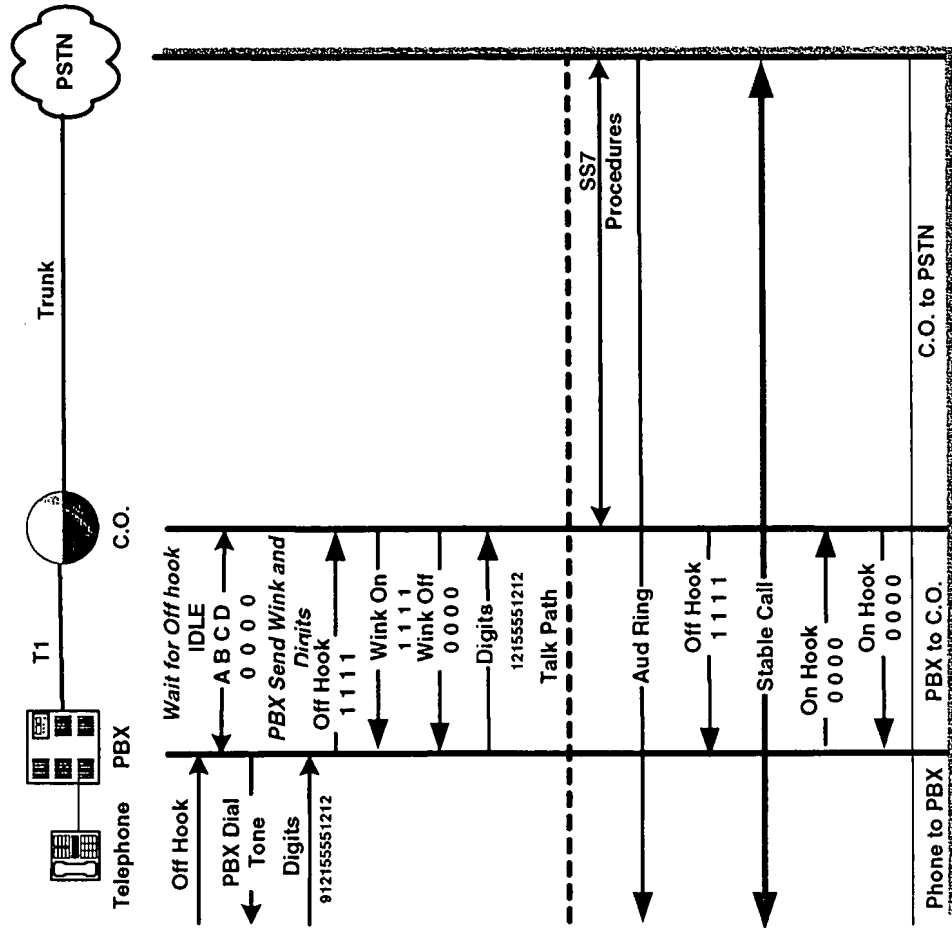


FIG. 7

1. The PBX is connected to the PSTN via a Trunk line.
 2. The PBX is connected to the C.O. via a T1 line.
 3. The PBX is connected to the Telephone via a PBX line.
 4. The PBX is connected to the C.O. via a C.O. line.
 5. The PBX is connected to the Telephone via a Telephone line.
 6. The PBX is connected to the C.O. via a C.O. line.
 7. The PBX is connected to the Telephone via a Telephone line.
 8. The PBX is connected to the C.O. via a C.O. line.
 9. The PBX is connected to the Telephone via a Telephone line.
 10. The PBX is connected to the C.O. via a C.O. line.

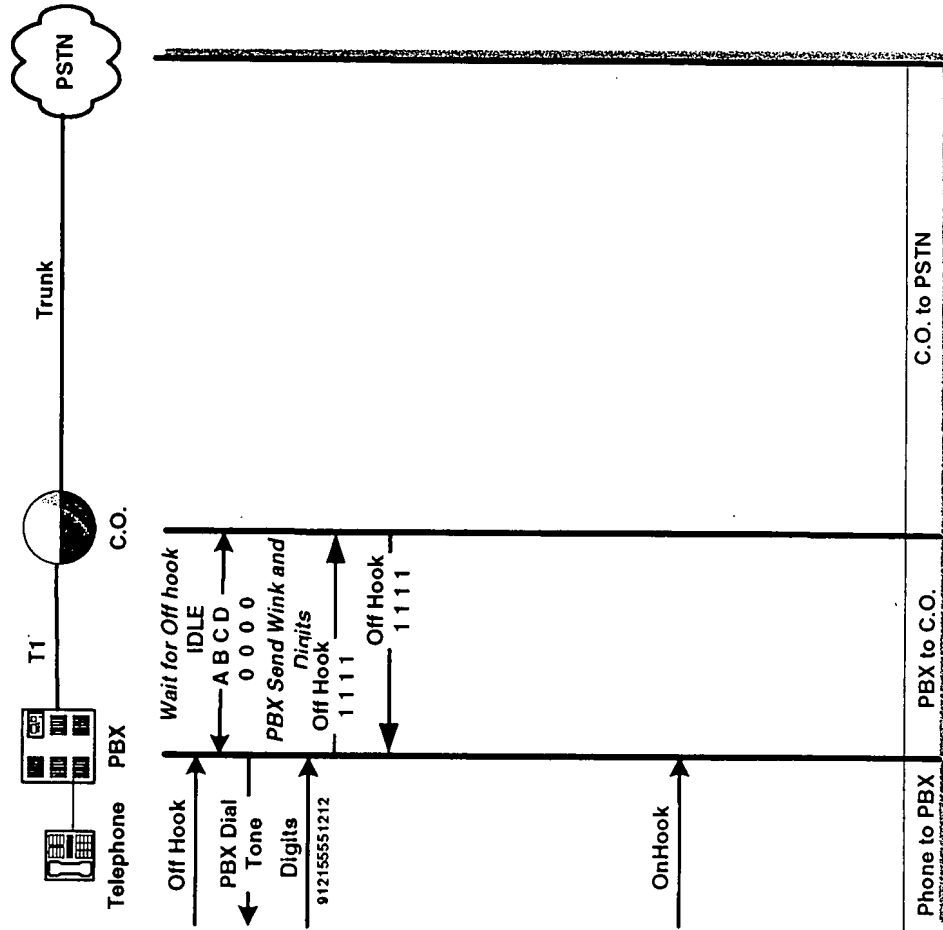


FIG. 8

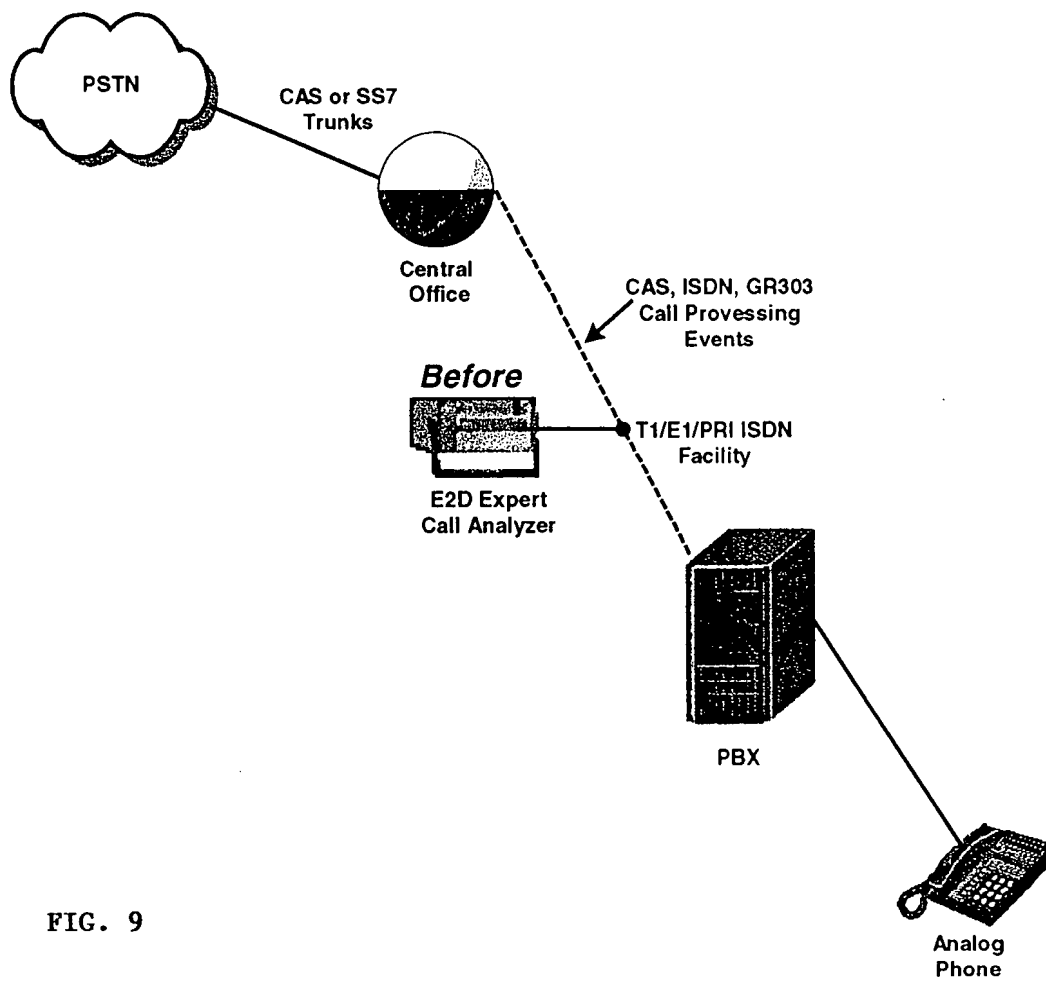


FIG. 9

Subscriber:

Facility Type: T1, ESF, B8ZS

Date: 04/13/99

Facility	Channel	Circuit Type	Outgoing Call Count	Incoming Call Count	Status
1	1	2Way Wink Start DTMF	132	0	
1	2	2Way Wink Start DTMF	112	0	
1	3	2Way Wink Start DTMF	97	0	
1	4	2Way Wink Start DTMF	88	0	
1	5	2Way Wink Start DTMF	65	0	
1	6	2Way Wink Start DTMF	40	0	
1	7	2Way Wink Start DTMF	36	1	
1	8	2Way Wink Start DTMF	23	1	
1	9	2Way Wink Start DTMF	18	4	
1	10	2Way Wink Start DTMF	12	7	
1	11	2Way Wink Start DTMF	8	11	
1	12	2Way Wink Start DTMF	5	34	
1	13	2Way Wink Start DTMF	2	46	
1	14	2Way Wink Start DTMF	1	58	
1	15	2Way Wink Start DTMF	0	69	
1	16	2Way Wink Start DTMF	0	81	
1	17	Not Used	0	0	
1	18	Not Used	0	0	
1	19	Not Used	0	0	
1	20	Loop Start Voice	15	12	
1	21	Loop Start Voice/Modem	8	10	
1	22	Loop Start Modem	5	1	
1	23	Loop Start FAX	33	9	
1	24	Not Used	0	0	
Total			700	344	

FIG. 10

Digit Map

Subscriber:

# of Digits	Digit String	Direction
1	None	
2	90	Outgoing
3	900	Outgoing
4	XXXX (4000 - 6500)	Intra PBX
	9411	Outgoing
	9611	Outgoing
	9711	Outgoing
5	None	
6	None	
7	None	
8	Dial 9, XXXXXXXX	Outgoing
9	None	
10	None	
11	Dial 9, 1, NPA-NXX-XXXX	Outgoing
	Dial 8, 1, NPA-NXX-XXXX	Outgoing
	Dial 8, 0, NPA-NXX-XXXX	Outgoing
12	None	
13	None	
14	Dial 8, 011, CC-XXXXXXXX	Outgoing
15	None	
16	Dial 8, 011, CC-XXXXXXXXXXXX	Outgoing
17	None	
18	None	
19	8, 1010, XXX, 1, NPA-NXX-XXXX	Outgoing
Misc.	XXXX - IVR/Voice Mail	Incoming

Notes:

Toll Diversion Detected
Answer Supervision Detected
Avg. Inter-Digit timing = 127 ms
Auto-dialers detected - Inter-digit timing 45 ms
No International calls detected

FIG. 11

Call Handling Performance - Totals

Subscriber:

Date: 04/13/99

	Attempts	Comp	Bad Digits	Abdn. Calls	Reorder	Busy	Other	Voice	Data	FAX
Incoming Calls	352	343	0	2	0	5	2	343	1	9
Outgoing Calls	797	700	23	41	4	16	13	660	7	33
Busy Hours	10:00	11:00	13:00	14:00	16:00	17:00				
Available Circuits	20	18	20	20	20	20				
Required Circuits (.1% Congestion)	23	25	19	21	28	22				

Top 10 Failures

Trouble	Direction	% Total Calls
Ring No Answer	Outgoing	4%
Bad Digits	Outgoing	2%
Busy	Both	2%
Dead after Dialing	Outgoing	1%
Reorder	Outgoing	.3%

FIG. 12

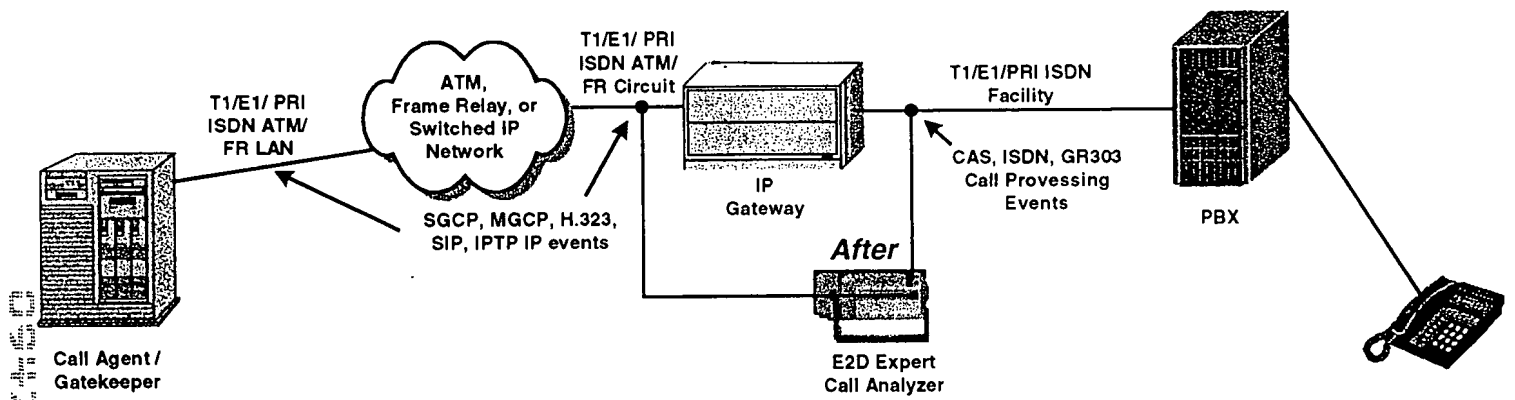


FIG. 13

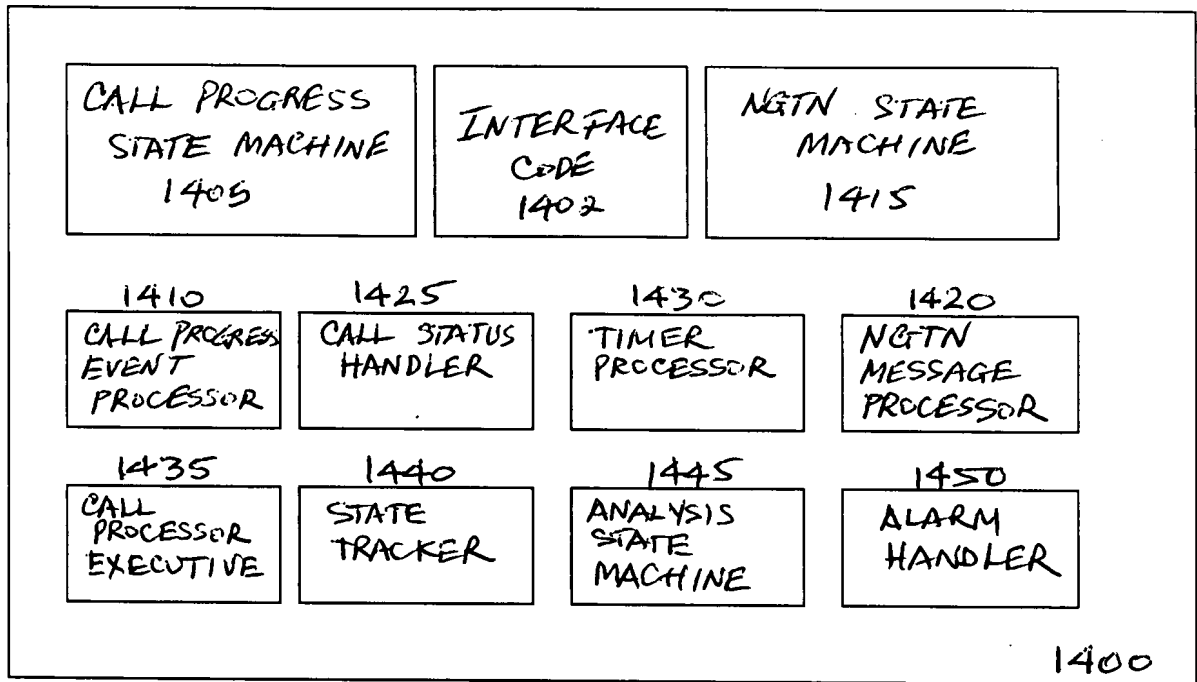


Figure 14